

PROCEEDINGS

OF THE

ROYAL SOCIETY OF MEDICINE

EDITED BY
SIR JOHN Y. W. MACALISTER
UNDER THE DIRECTION OF
THE EDITORIAL COMMITTEE

VOLUME THE FOURTEENTH

SESSION 1920-21

PARTS I & II

GENERAL REPORTS

SECTIONS:—

ANÆSTHETICS	BALNEOLOGY AND CLIMATOLOGY
STUDY OF DISEASE IN CHILDREN	CLINICAL DERMATOLOGY
ELECTRO-THERAPEUTICS	EPIDEMIOLOGY AND STATE MEDICINE
LARYNGOLOGY	MEDICINE NEUROLOGY



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The Royal Society of Medicine.

President — Sir JOHN BLAND-SUTTON, F.R.C.S.

OCCASIONAL LECTURE.

Observations on some of the Diseases of Animals communicable to Man.¹

By FREDERICK HOBDAI, C.M.G., F.R.C.V.S., F.R.S.E.

(Honorary Veterinary Surgeon to H.M. the King, and formerly Professor of Therapeutics and Hygiene in the Royal Veterinary College, London.)

THE students of human medicine nowadays have become specialists and subdivided specialists, and the students of veterinary medicine also, but there is room even yet for a still further specialism—viz., for those who will bridge the gap between the two, and specialize in comparative medicine. By that I mean, to study the analogies and differences shown in diseases intercommunicable between animals and men, and the manner in which they affect respectively the various species. A comparison between the different manner in which a disease affects man (whose thinking powers are so highly developed) and the various species of animals who have no thought for the future but only live (some of them very short lives) to look forward to a meal, and automatic sleep and the excitement of an occasional fight or love affair, is well worth special study and always produces points of value and interest.

There can be no doubt that by studying comparative medicine we greatly enlarge our sphere of knowledge, and by comparing the symptomatology, the sites especially affected, immunity or susceptibility, we shall progress forward more rapidly in the fight against disease; and that investigators will often save themselves much time at present lost in unnecessary side-tracking. Besides that, the knowledge of the fact that certain species of animals are refractory (or even completely immune) to certain diseases is of enormous value to the student of disease problems, and this fact requires a satisfactory explanation, if only it can be discovered. The immunity of the ox tribe to glanders is the best illustration of a disease of this kind. Why should the ox be immune to glanders when the horse, ass, mule, certain carnivora, and man fall easy victims to it? A knowledge of the diseases of animals communicable to man can only be beneficial to the worker in human pathology, and investigation shows what an astonishing number of such diseases there are. The comparative aspect of any one of them could be made the subject of a separate paper, but my intention this evening (the first occasion on which the Fellows of the Royal Society of Medicine and the Fellows of the Central Veterinary Medical Society have met together) is to generalize my remarks and to introduce the names of certain diseases which are met with in Great Britain, and which are communicable from animals to man, with the object of drawing attention to the great value of a knowledge of the comparative

¹ Lecture delivered at a combined meeting of the Royal Society of Medicine and of the Central Branch of the National Veterinary Association, February 3, 1921.

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aspect of each; and, in order to attain that knowledge, to emphasize the necessity for collaboration and co-operation between the medical and veterinary professions.

We have at the present time in Great Britain at least the following, which are indisputably communicable: Glanders, anthrax, tuberculosis, rabies, foot and mouth disease, mange of all animals (the horse, ox, camel, dog, cat), ringworm (especially of the horse, calf, cat and mouse) and certain forms of seborrhœa (such as farriers contract from handling horses with greasy legs). And I think that the great prevalence of pyorrhœa in pet dogs (which are so kissed by their fair owners, and are allowed to lick their lips and hands), should be regarded as a possible factor in the spread of that disease in human beings. It may in the future be added to the list above given.

Others produced by parasites require an animal host in order to make their life cycle complete, before they can become pathogenic to man, such as the echinococcus, the *Cysticercus bovis* (the larval stage of the *Tænia saginata* of man) and *Cysticercus cellulosæ* (the larval stage of *Tænia solium*) the parasites of measles beef and measles pork respectively, and the *Trichina spiralis* of the muscles of the pig, which gives rise to trichinosis in man, in countries where ham is largely eaten smoked, and not necessarily cooked.

I purpose now briefly to take each in turn and consider the most important points which affect mutually man and the lower animal, and how the veterinary surgeon can help his medical confrère. I would specially emphasize a careful consideration of glanders, anthrax, rabies, foot and mouth disease, and certain forms of mange and ringworm, as their only source is from one or other species of animal, and when we of the veterinary world have completely stamped out these diseases among our patients, they will automatically cease to exist in man, an attainment which will reflect credit on the study of comparative medicine.

Tuberculosis is peculiar in being not only communicable from man to man, animal to animal, animal to man and vice versa, also to birds; but, in addition, through milk and meat. In view of this danger it is deplorable that milk and meat inspection should so often be merely perfunctory in this country.

GLANDERS.

I take glanders first, as when this disease is eliminated from the veterinary schedule it will disappear as a disease of mankind. Even as it is medical men are frequently unable to diagnose this infection, so rarely is it seen: but the veterinary surgeon with the aid of mallein can almost invariably make his diagnosis with certainty within forty-eight hours.

Here the veterinary profession has to lead the way, and that it is doing so is shown by the fact that in 1901 (only twenty years ago) some 2,370 horses were destroyed for glanders in Great Britain (1,828 of these coming from London) and that the present statistics of the veterinary department of the Ministry of Agriculture show that during the past year (1920) only fifteen outbreaks occurred in the whole of the British Isles, with a total destruction of only twenty-two animals. And this too, after the sale of some 150,000 Army horses and mules which had been collected from various countries and employed in the work of the great War.

Mallein is a sure diagnostic test and an important agent in the eradication of this disease. By its aid glanders was completely kept under control among the thousands of British horses and mules during the late European War, and I believe that during that time no case of glanders in man was ever reported;

whereas during the South African Campaign, glanders was terribly rife amongst animals and caused endless anxiety both to veterinary and medical officers.

Some fifteen to twenty years ago, in the districts of London which contained large cab and omnibus stables it was a rare thing for a County Council Veterinary Inspector to miss a day without being called in to see a suspected case of glanders, and I recollect one stud of about 2,000 horses from which we got some ninety glandered horses within twelve months. Mallein was then on its trial and the law did not enforce its compulsory use in the in-contact cases, the consequence being that when the owner of the stable had an outbreak of glanders he promptly sent the in-contact animals to a repository and thus disseminated the disease broadcast. Twice I have officially been



Intradermal palpebral reaction to mallein.

(From the Clinical article in the *Veterinary Journal*, August, 1920, by Captain Howard B. Collett, B.V.Sc., M.R.C.V.S.)

present at the post-mortem examination of men who had died of the disease and in neither case was the disease suspected until just before death, one patient being treated for pleurisy and the other for rheumatism.

At the present time mallein is compulsorily applied by law to all ponies before they are sent underground for colliery work, and when an outbreak takes place in any stud or stable in any part of the British Isles the whole of the in-contacts are immediately quarantined and tested. All reactors are destroyed, all suspects are set aside and re-tested until the Veterinary Inspector is satisfied that a clean certificate can be given to the stud.

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During the late War special precautions were taken by the officers of the Royal Army Veterinary Corps to isolate and mallein all animals on purchase and again on admission to, and evacuation from, veterinary hospitals. All units were malleined at regular intervals and when finally sold either for work or for human food all animals were previously submitted to this test. In this way millions of doses were used, but the result justified the trouble taken and no army of the whole Allied force was so free from glanders as ours.

The infection is usually transmitted to man from a glandered horse, ass or mule, by means of the nasal discharge, the discharge from a farcy-bud, or by contact of an abraded surface with a sponge or brush, or stable utensil, which has become contaminated with some of the infectious discharge from the animal. The possibility of infection of man by ingestion was emphasized by the late Mr. Hunting, Chief Veterinary Inspector of the London County Council, who observed men handling the nostrils of infected horses, and then eating their bread and meat, or bread and cheese, without washing their hands.

The men most commonly affected are those whose life brings them into contact with horses, and records in medical journals confirm the hopelessness of treatment when once the disease has become established.

I believe I am correct in stating that there is only one instance on record in which a human patient has survived and permanently become clear of a glanders infection, the fortunate man being a well known member of my own profession; but it was only after endless operations and several years of painful treatment that his medical advisers were able to certify the signal "all clear." One of those who died of this disease last year was a veterinary bacteriologist of the Government of India, a man of great promise, the disease being contracted during his course of duty.

Glanders in carnivorous animals has been observed in lions fed in a zoological garden on infected horse-flesh which was given raw.

It is gratifying to read in the Annual Report of Sir Stewart Stockman, the Chief Veterinary Officer of the Ministry of Agriculture, that "this disease is now approaching the point of eradication." When that is accomplished in horses, there will also be one less disease for the human race to fear, and one less hopeless disease for our medical confrères to be called upon to diagnose.

ANTHRAX.

Anthrax still takes its toll of both animal and man, being met with in man principally amongst those who have to deal with animal products, such as skin, hair, wool and hides from abroad; and those who make, or assist at, post-mortem examinations on dead animals. The infected Japanese shaving brushes, reports of which have recently appeared in the daily press, is another source of danger.

With the veterinary surgeon the disease is seen most commonly in cattle, although one meets with it in the horse, sheep, pig, and even the dog; in the dog its behaviour is rather more refractory than in other animals.

The returns of the chief veterinary officer of the Ministry of Agriculture for 1919, show that Wales had been absolutely free for three years, but that 180 outbreaks were confirmed in England and fifty-nine in Scotland. In all, 275 cattle, eight horses, one sheep, thirty-eight pigs, one dog and seven ferrets were affected. Twenty-five per cent. of the outbreaks took place on premises where anthrax had occurred the previous year.

The annual average, owing to the precautions taken by the officials of the Ministry, has reduced the number of outbreaks from an average of about

1,000 annually between 1907 and 1910 to 239 in 1919. It is a troublesome disease and difficult to control but the measures at present taken appear to be keeping it in check.

If only the disinfection of imported things such as hides, wool and hair, &c., can be thoroughly controlled, we shall hear of fewer cases in man, and the same may be said in regard to the supply of cotton and other cakes imported into Great Britain as a food for cattle. The following surmises were made as to the source of the 1919 outbreak:—

- (1) Effluent of tanneries or other similar industries getting into streams.
- (2) Feeding of infected offal to pigs.
- (3) Use of imported food-stuffs and artificial manures.
- (4) Contaminated sewage.
- (5) Contact with infected material of other outbreaks.

It is thus by attention to the complete disinfection of animal products and the sources of contamination by animal products that we shall diminish the chances of infection to man. For animals themselves it is a more difficult problem as so much of their food material must of necessity come from abroad and a good deal of it comes from countries in which anthrax exists to a considerable extent.

It is the destruction of the spores which is so difficult, but a good fight is being maintained and if only the disease can be kept under control among the animals of the farmer, the veterinary profession will be doing a good deal towards helping to make it a rare disease in man.

RABIES.

Rabies has had no place in this country for nearly twenty years, until lately, and the present inconvenience from which dog-owners in several parts of England have to suffer is entirely due to the surreptitious importation of some dog, which at the time was in the incubation stage of the disease. All Continental countries with the exception of Norway, Sweden and Denmark are infected, and although mainly seen in the dog, rabies is also met with in the horse, cow, sheep, cat, fox, wolf and even the fowl, in some of which it produces a train of symptoms which are rather curious and which to the layman may not give rise to any suspicion of the disease, and this perhaps may even lead to disaster.

Everyone knows something about the suspicious signs in the dog, although the classical symptoms are by no means constant. The change of manner, the desire to hide in dark corners, great excitability towards strange people and strange dogs, restlessness and weariness, snapping at imaginary flies, the attempts to chew and futile attempts to swallow all objects near at hand, the inability to swallow water, and the continual salivation and the final violent rage in the mad form—or the typically dropped jaw in the paralytic form—are all characteristic of the rabid dog. It is strange too, what long distances the dogs will cover in their unconscious frenzy, wandering aimlessly on for miles; and it is for this reason that sometimes a large area or district has to be placed under the restrictions of the Ministry of Agriculture. The voice, too, becomes altered, the bark being hoarse and accompanied by a most peculiar howl, the sound of which, when once heard is never forgotten. Paralysis of the hind-quarters and complete exhaustion and coma finally close the scene if the disease is allowed to terminate its existence.

In the cat the symptoms are even more violent than in the dog, and a rabid cat is even more to be feared by man than a rabid dog. It will bite and

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scratch, attacking men and animals in a most reckless fashion. The voice changes in tone and eventually paralysis of the hind-quarters comes on as with the dog.

In the horse and ox, there is violent excitement and a particular symptom which has been noted again and again is an attempt to bite or rub the scar of the original site of infection, as it is practically always from the bite of a rabid animal that their infection occurs. Sexual excitement is often present. Paralysis of the hind-quarters is the common sequel and the disease is always fatal.

The 1919 Annual Report of the Chief Veterinary Officer of the Ministry of Agriculture showed that 143 cases of rabies were confirmed in that year, there being 140 dogs, two horses and one pig. The first case was imported into Plymouth somewhere about May, 1918, and it is for this piece of criminal thoughtlessness on the part of someone that we owe the fact that we are now again an infected country. During 1919 alone 179 persons were bitten by animals in the scheduled areas, forty-six of whom were bitten by animals proved to be rabid. Treatment was arranged by the medical officer of the Ministry of Health, and it is a triumph to the memory of Pasteur that there have been no deaths from hydrophobia.

By the present arrangements the neck and head of any dog which has died or been killed as a rabies suspect is despatched at once to the Veterinary Laboratory of the Ministry of Agriculture, together with a history from the field Veterinary Inspector who made the post mortem. This is then dealt with at once, the Negri bodies are searched for, and, if necessary, inoculation experiments are made. The result has worked out that in 96 per cent. of cases a decision could be given at once, thus saving those patients who had been bitten much suspense and anxiety, and, what is more, enabling the medical officer to advise and urge immediate anti-rabies treatment.

At the present time the necessity for the Muzzling Order still exists in certain areas, and both medical and veterinary practitioners must be on the look-out for rabies; but there is no doubt that what has been done before can be done again and that by ridding an island like ours of rabies amongst animals the veterinarian will again render signal aid to his medical confrère.

FOOT AND MOUTH DISEASE.

Foot and mouth disease, as a disease communicable from animals to man, is not of quite the same importance as those previously alluded to; but it is important because, if neglected, it would cause a certain amount of trouble in human beings on account of the ingestion of the milk. This is not at all uncommonly seen in countries where foot and mouth disease is indigenous and at the present moment in England I am told of at least one definite case of contagion to an official who was constantly examining mouths and feet being in existence at the present moment. Foot and mouth infection can only come from infected cattle, and not only may man be the victim, but the disease can also be transmitted to the sheep, goat, and pig, whilst horses and even fowls are not immune.

In most European countries it is always present, and it is owing to our insular position and the precautions taken by the Ministry of Agriculture that we have kept so free in the past. This country was entirely free from 1895 to 1899 and again from 1903 to 1908 with the exception of two small outbreaks which were easily suppressed. The present outbreak is very obscure in origin and as the virus is due to an invisible organism, and the disease one of the

most insidious and contagious with which we have ever had to deal, it has presented many difficulties. Had not the outbreak been taken firmly in hand at once it is certain that it would have cost the agriculturist millions of pounds, and it is also highly probable that one more disease would have been added to the list of the medical practitioner for treatment. As an indication to what extent it will spread it is only necessary to mention that in 1892 in Germany no less than 1,504,299 cattle, 2,193,157 sheep, 17,782 goats and 438,262 pigs were affected: whilst in other countries of the Continent it raged equally violently.

Even as recently as the spring of 1919, the North of Italy was visited by a terribly virulent form of the disease and a great many of the agriculturists of the provinces of Milan, Turin, Tuscany and Cremona were ruined in consequence, as it not only affected the milking cattle but also the working bullocks.

MANGE.

With regard to *mange*, the parasite of the disease is present in all animals and is always a source of danger to man, and infection has been noted on many occasions. Three varieties of parasites are found on the horse, a sarcopt, a psoropt, and a symbiote, but it is the two former which give trouble and man gets his infection from contact with mangy horses, their grooming tools, food utensils, &c., usually on the chest (especially if a hairy man) and the under surface of the forearm and on the hands. Riding a mangy horse has been known to infect men down the inside of the legs and in the pubic region, and during the late War this happened on numerous occasions; knacker men are frequently infected when employed in skinning mangy horses. Sarcoptic mange is very troublesome to get rid of in the horse and its riddance takes several months to effect, but the psoroptic variety is much more amenable to treatment.

Sulphur, in some form or other, forms the basis of most treatments, and I have a number of illustrations here which will show some of the methods employed during the war for dealing with extensive outbreaks of the disease where large bodies of army horses were concerned.

In Great Britain it is a notifiable disease and has to be reported to the authorities.

That mange in the dog and cat is transmissible to man does not seem so generally known and appreciated as it ought to be, and some time ago Dr. Whitfield and myself published the histories of some seventeen cases in which he confirmed the existence of the sarcoptic parasite in the human subject, and I confirmed it in the dog. In a canine clientele one frequently gets a person with a mangy dog who complains of an irritable skin, usually the region of the inside of the forearm, and it is here that the little dog rests its head when being nursed. The contact of the warm flesh causes the mange parasite to leave its original host and transmit itself to the human flesh where it sets up a good deal of irritation. In some of these seventeen instances the infection had taken place in the region of the neck and chest owing to the objectionable habit of allowing the little dog to sleep in that situation, and one lady was infected on the abdomen.

The lesions produced were described by Dr. Whitfield as small vesicles, slightly smaller than the ordinary eczema vesicle and surrounded by a narrow zone of hyperæmia, very like that of varicella, only about one-eighth of the size. These lesions were scattered discretely over the surface and not in grouped lesions. The intense irritation leads to the decapitation of the little vesicles and their original site becomes covered with either a serous or a blood scab.

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If left untreated the parasite will live in the human subject for about six weeks, but if treated, I am told that it is readily got rid of.

In the dog we have two varieties of parasite, the *Sarcoptes canis* and the *Demodex folliculorum*, the latter giving the veterinary endless trouble to cure. Both are infectious to man. Sarcoptic mange yields readily to treatment, but it takes about a month or six weeks to effect a certain cure. If neglected the dog becomes covered with scabs and sores, gets thin and emaciated, has a peculiar mousy odour and will eventually die.

I have with me to-night a cat, the subject of sarcoptic mange, really so loathsome and miserable an object that one cannot understand the owner or her servants not having observed its condition long before. This animal has been infected for some weeks and has been wandering about the house without restriction. The uncastrated male cat is, in all large towns, a fruitful source of the spread of sarcoptic mange amongst the females and indeed to other males with whom he is constantly at war.

RINGWORM.

The forms of ringworm of the horse, calf, dog, and cat, are those which interest us most to-night from the point of view of contagion to man. All are contagious and give considerable trouble in their treatment. In country districts the calf is the constant source of infection, and in town generally the cat. Dr. Whitfield and others have recorded several cases of infection from animal to man.

"MEASLES" IN BEEF AND "MEASLES" IN PORK.

The specimens I have here are those of measly beef and measly pork. The former, as you know, is due to the *Cysticercus bovis*, the larval form of the *Tænia saginata* of man. The *Cysticercus cellulosæ* in the muscle of the pig is the larval form of the *Tænia solium* of man. The occurrence of each furnishes a plea for proper meat inspection, the general neglect of which in England, as I have already said, is lamentable. Fortunately it is our custom to cook our food well, and to this we owe a good deal of freedom from disease.

TRICHINOSIS.

Trichinosis is a parasitic affection in the muscles of the pig, from which it is transmitted to man in sausages or other infected food which has not been thoroughly cooked. Dogs and rats, amongst other animals, are also the subjects of this disease, and the pig becomes infected from eating rats and mice, also from eating the flesh and offal of other infected pigs. It is a disease which is particularly met with in Germany and America (and other countries, too), where a special system of meat inspection is instituted on account of its prevalence.

TUBERCULOSIS.

The subject of tuberculosis, to which I have already alluded, I have purposely left to the last, and even now I almost think it had better be left—to be introduced and discussed on another occasion. The question of clean milk and clean meat is too important to admit of a casual reference.

I will only say that before the war the matter of a clean milk supply and the eradication of tuberculosis from our herds of cattle was being taken up with vigour. Soon it is to be taken up again. It is necessary, very necessary, that tuberculosis shall be rooted out of our herds in order to assist in its disappearance from man.

In conclusion I ask leave again to draw attention to the important part played by animals in the transmission of certain diseases to man and to say that in the combat against disease, the workers in human and veterinary medical science go over much ground in common. By working in unison much valuable time may be saved and much better results will be attained than if each keeps itself in its own water-tight compartment.

[The following letter was received by the author from Professor Clifford Allbutt, M.D., F.R.S.]

St. Radegund's, Cambridge,
February 2, 1921.

Dear Professor HORDAY,—I would have made no little sacrifice to be present and take some part in the discussion of your paper to-morrow but that day is deeply engaged in more than one way, and to leave home is *just impossible*. You know that ever since 1888 I have been speaking and writing to urge the consolidation of students of medicine in all its branches; and that without the comparative method the progress of our art and its sciences cannot make active growth on the larger lines.

The instances you quote of the peril to man from animal diseases, and I may add from diseases of plants, are grave enough in themselves to drive this lesson home; but there is far more than this—a point of view which you indicate—namely, that only in the light of disease as a whole can its parts be adequately known, and its intimate laws understood. We have only to look at the fertile results of the comparative method in other studies to realize the need of this method in medicine. I may allude, as instances, to comparative anatomy and morphology, to the comparative method in history, languages, religion, and, indeed, every subject of thought which has advanced far enough to avail itself of the method.

I had hoped ere this to have found some public-spirited person or group to help us to establish such an Institute in Cambridge, where we have in our Field Laboratories, Agricultural Department and so on, much of the groundwork for such an institute. I still hope the pedigree stock breeders, racing men, nurserymen, and others interested in such matters, and who are now suffering such enormous pecuniary losses, may endow us with the means of establishing a place sufficient for practical and theoretical work on comparative medicine, both of plants and animals. Meanwhile, let us work as hard as we can in this direction; let us recognize that not only ought experts in diseases of animals and plants to come together, but also that in a university like Cambridge many students would find themselves attracted by the larger field, and the endless variety of experience and opportunities for research which comparative pathology would offer to their enterprise. I welcome this combined meeting very cordially as a beginning of a new and very hopeful development of medicine.

Believe me, yours very truly,

CLIFFORD ALLBUTT.



The Royal Society of Medicine.

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SPECIAL DISCUSSION ON "THE ERADICATION OF TUBERCULOSIS FROM MAN AND ANIMALS."

Sir JOHN MCFADYEAN,

referring to the subject dealt with at the previous conjoint meeting,² said that, so far as he was able to judge, there had not been in recent years any tendency to overlook the importance of the diseases communicable from animals to man. The tendency actually appeared to be in the opposite direction. At veterinary meetings the diseases of animals communicable to man had often been discussed in the past, and in this connexion things sometimes appeared to be presented in a wrong perspective. The truth was that the points in which the everyday practice of veterinary surgeons and doctors met were few. The diseases recognized to be common to man and animals formed a considerable list, but it was undeniable that in most of them cases of actual transmission from animals to man in this country were at the present time about as rare as deaths from lightning, and transmission in the opposite direction was still rarer. Nearly all the diseases communicable from animals to man were now so rare in this country that if they were equally divided each veterinary surgeon would not have to deal with one per annum. Needless to say one could not expect members of either profession to take an intense interest in diseases that were so rarely met with in practice.

Tuberculosis was the great exception to the rule among the diseases of animals communicable to man, and it was therefore not surprising that it was the one selected for discussion at this second conjoint meeting.

What was termed tuberculosis was met with in all the domesticated animals, but avian tuberculosis was now by general consent regarded as a disease distinct from that which prevailed in man and other mammals, and cases of its transmission to other farm animals or to human beings were unimportant on account of their rarity.

For the veterinary profession the great tuberculosis was that which affected the bovine species, and as regarded economic importance it alone was important. It was essentially a disease of cattle, in the sense that the type of bacillus which was the cause of it would cease to exist if the bovine species became extinct. It was an independent disease of cattle in the sense that the eradication of human tuberculosis would leave its incidence among cattle unaffected.

On the other hand, the eradication of bovine tuberculosis would reduce nearly to vanishing point the loss which tuberculosis at present caused in pigs

¹ At a meeting of the Society, with the members of the Central Branch of the National Veterinary Medical Association, March 14, 1921.

² *Proc. Roy. Soc. Med.*, 1921, xiv (Occ. Lect.), pp. 1-9.

and other farm mammals, and it would sensibly diminish the cases of human tuberculosis, especially those which had their starting point in connexion with the alimentary canal.

There were two incentives to an effort to eradicate tuberculosis from the bovine species, and the one might be termed "economic" and the other "humanitarian." In order to estimate the force of the economic incentive one must be informed regarding the loss at present inflicted by the disease on agriculturists and others who bred and kept cattle.

Cattle of all ages were subject to infection with tuberculosis and the incidence rose with age and reached its maximum among old cows. It was scarcely possible to say what proportion of the entire cattle population was affected, because they had neither slaughter-house statistics nor the records of tuberculin testing of young cattle on a sufficient scale to warrant precise conclusions. It was quite certain, however, that the proportion affected under 2 years old throughout the country generally was low. In breeding animals from 3 years upwards it could not be estimated at less than 30 per cent., and in the principal milking breeds it was probably at the present moment nearer 40 per cent. Much higher percentages were not at all rare in particular herds. In spite of this the mortality was low, and in well-managed herds it was often under 1 per cent. per annum over a period of years.

Unlike some other contagious diseases of cattle, tuberculosis was thus not generally so serious from the farmer's point of view that he felt compelled to take measures to eradicate it from his herd if these measures involved either great trouble or great expense.

There were exceptions to the rule that the existence of tuberculosis in a herd did not cause great loss, but in such exceptional cases one usually found on inquiry that the owner had taken no precautions whatever, and that he had been in the habit of keeping tuberculous animals on in the herd long after they had become visibly affected. It was an interesting fact that in such circumstances not only was the proportion of animals affected increased, but the proportion of cases that assumed the clinical form and developed udder lesions was also increased.

In cattle, just as in man, in the great majority of cases actual infection did not become manifested by obvious deterioration of health.

With regard to the humanitarian motive for attempting the eradication of bovine tuberculosis, it might be recalled that the late Professor Koch, at the International Congress on Tuberculosis in London in 1901, lent the weight of his great authority to the view that the danger of the transmission of the disease from cattle to man was so small that it was not worth while taking measures to counteract it. At the present time instructed medical opinion throughout the world appeared to be solidly in favour of the view that the frequency with which tuberculosis was transmitted from cattle to man did provide a strong incentive to complete eradication of the bovine disease. He would leave it to the eminent medical authorities who were to take part in this discussion to deal with this part of the subject, but it would be interesting to hear what they thought of the new view that the passage of tubercle bacilli from cows' udders to the stomachs of children might actually be beneficial to the human species by producing an immunizing effect and thereby diminishing the results of subsequent infection with the more virulent human type of tubercle bacillus.

Turning now to the question of eradication, there was not the least doubt that the disease could be eradicated within a few years, if that were considered

necessary, regardless of cost. This could be effected by enforcing the general testing of all the cattle in the country, followed by compulsory slaughter of all the reacting animals. It need hardly be said that, having regard to the facts already mentioned concerning the present incidence of the disease, any scheme of that kind was unthinkable. Such a scheme would involve the slaughter of from one-third to one-half of all the milking cattle in this country, and also a considerable proportion of the younger stock. Putting aside the fact that it would involve the payment of a huge sum of money to compensate for the slaughter of apparently healthy cattle, it would immediately and for a good many years to come greatly reduce the supply of milk, and add in a proportional degree to its already high price.

Speedy eradication being thus impossible, it might be asked whether the ultimate complete extinction of the disease might not be achieved by some slower and less expensive method. If in considering this question one could have regard only to the present stage of knowledge, the answer must be that unless a great discovery was made with regard to vaccination against the disease, one could not hope for anything beyond a very slow reduction in its present prevalence.

Since for a long time to come drastic compulsory measures aiming at the speedy eradication of bovine tuberculosis would be impossible, it was worth considering whether it would be useful to encourage and in some way reward the voluntary efforts of owners to get rid of the disease. Many people were under the impression that the eradication of tuberculosis from a herd was not a matter of any great difficulty, but in this country it was not practicable for more than an insignificant minority of farmers and others who kept milking herds.

In this country there was one class of owners many of whom might succeed in freeing their herds from tuberculosis—viz., those who possessed highly valuable pedigree herds. To owners who could find accommodation for reacting animals on a separate farm or in entirely separate buildings eradication was undoubtedly possible, and the Institute in Animal Pathology at the Royal Veterinary College had recently made an offer to lend its assistance to the owner of any pedigree herd who was prepared to carry out the measures actually necessary to that end.

Just because it was not possible to put into force the drastic measures that would be necessary to eradicate tuberculosis within a period that anyone could name, it was necessary to enforce such measures as appeared to be practicable and necessary to prevent or diminish the cases of human infection from cattle. In the past very exaggerated views had been held regarding the danger of infection through meat, but at the present time there was general agreement that milk was the great vehicle of infection, and that cases of transmission of bovine tuberculosis to man would be greatly diminished if one could cut off from human consumption the milk which came from cows that were actually infected with tuberculosis of the udder, or were at an advanced stage of the disease. That was the object aimed at by the Tuberculosis Order which came into force in 1913, and the slightly modified Order which replaced that in July, 1914. It was a misfortune that the latter Order was suspended in August, 1914, owing to the outbreak of war, and if the subsequent discussion indicated that those present were in sympathy with the proposal, he would be prepared, with the approval of the President, to move a resolution to the effect that the re-introduction of the Order was urgently necessary in the interests of public health.

Professor S. LYLE CUMMINS

said, with reference to Sir John McFadyean's question about the importance of bovine tuberculosis as a disease affecting man, that it raised several acutely controversial points. In Professor Cummins' opinion, when questions proved to be acutely controversial it was generally found that no very certain knowledge existed on either side. In a sense this was true as to the importance of bovine tuberculosis in this country. On one side much knowledge was being gained at the present time through researches of Dr. Stanley Griffiths at Cambridge and of others, some actually present at this meeting. It could be stated without any hesitation that bovine bacilli did cause fatal disease in human beings. It was known that they caused much of the abdominal tuberculosis of children, and it was also true that they took their share in producing tuberculous meningitis. As to the possibility of milk charged with bovine bacilli having a beneficial action as a vaccine, they were on much more uncertain ground.

There was, he went on to suggest, a great deal of evidence to show that the human race, in England at least, did owe a considerable amount of immunity to the ingestion of bovine bacilli in milk. Some support for this theory was to be found, he thought, in recent statistical records published by Dr. J. Brownlee, in which it had been shown that there were two important types of mortality from pulmonary tuberculosis in this country—the one affecting young adults and being especially prevalent in the Shetlands, in Wales, and in Ireland, the other leading to a mortality in middle-age, and being commoner in our large towns. It had been shown that there was a definite correlation between the middle-aged type of mortality and milk supplies contaminated with tubercle bacilli, but no such correlation could be traced as between contaminated milk and mortality of the young adult type. As the middle-age mortality represented, presumably, a type of the disease on the whole more benign than that associated with earlier deaths, it was probable that some factor of resistance was operative in the one and absent in the other. Such a factor might perhaps depend on immunization following small bovine infections in early life. But while thinking that such a theory was not merely tenable, but probable, Professor Cummins was far from advocating the deliberate use of contaminated milk for the purpose of obtaining immunity. Even assuming that such milk did actually act as a vaccine, it must be regarded as a very dangerous one, because the doses could not be controlled, and a massive dose would certainly lead to serious illness and perhaps death.

Under these circumstances Professor Cummins was prepared to support strongly the views expressed by Sir John McFadyean that every possible effort should be made to provide milk as free as possible from tubercle bacilli. He quite agreed with Sir John McFadyean that the complete elimination of bovine tuberculosis was out of the question as a practical measure, but he thought that if their efforts for a pure milk met with success they might reasonably hope so to diminish the number of tubercle bacilli in milk-supplies that there would be no danger of clinical disease and every prospect of the acquisition of relative immunity. When all was said and done, far the most important type of tuberculosis in this country was pulmonary tuberculosis, a disease caused by the human bacillus. Apart from the question of infection by bovine tubercle bacilli, there were other very strong reasons for wishing for a purer milk-supply. Many other diseases besides tuberculosis could be caused by contaminated milk. There was no doubt that the nutritive substances in milk

were in very great dilution, and that the transport of milk involved the conveyance of very large volumes of fluid in proportion to the amount of nourishment contained therein. It was to be hoped that the physiologists might ultimately be able to say for certain whether the properties lost in the preparation of dried milk powder could be substituted efficiently by the addition of other articles to the diet of children.

Sir CLIFFORD ALLBUTT

said that he did not intend to detain them by a survey of the well-worked field of tuberculosis, of which many of his hearers indeed knew more than he did; yet he would try to say something new on the subject, even if it were paradoxical; as, indeed, it must be. Of the devastation caused by this virulent pest he need not speak, but as Robert Burns thought that there might be something to be said even for "Old Nickie-ben," so perchance to the evil spirit of tubercle some beneficent by-product might be credited. He remembered in the early days of his practice in the north how in the valleys of the Dales enteric fever was rampant and endemic; the farmsteads were foul with stench, vermin, and disease, but the farmers said that a good manure heap did no one any harm. However, the discovery of the exact causes of typhoidal affections led to a conversion of people who before had turned a deaf ear to all arguments. So it was with tubercle; you might as well have argued with one of his bullocks as with the farmer on the intimate causes of this disease also, until the discovery of the tubercle bacillus aroused the public to a sense of the intimate and subtle virulence of germs of disease which could be neither seen nor handled. Tuberculosis, then, was their schoolmaster to drive into them these truths; a schoolmaster which chastised them with scorpions indeed, but began its serious lessons with those innocents the butcher and the milkman. No less had been the revelations on glanders and the marvellous results in the war of mallein vaccines—results which were almost incredible when compared with the ravages of the disease in former campaigns. Here the education began with the stable-boys. Thus the lessons of many such diseases had at last persuaded the man in the street to listen to the truths and prophecies of science.

Sir Clifford Allbutt continued: Let me now bring before you lesson the second, which is to avoid a rush to the other extreme—namely, an unreasoning cry for "results." Our campaign against tuberculosis is proving to the layman that, as in the field so in the laboratory, times and seasons are not to be controlled nor reckoned upon. A long cleaning of the land comes first, then after the fallow we have to plough and harrow to make a fine tilth, then to await due weather to sow the seed, then to keep patience during the long dormancy of seed apparently dead in the soil: and then again many a contingency before harvest is secured. If we are to solve these problems we need capital, time, and patience on the part of those awaiting our results. They cannot be hurried. In the schools maxims can be instilled in some order and with expedition, but discovery, the work of the universities, cannot be hurried nor produced to time. The third lesson of our schoolmaster is that if we are to understand the laws of disease in any one field we must co-ordinate it with work in other and allied fields of pathology. Every study but medicine has recognized and pursued the comparative method—anatomy, history, religion, law, philology, and so on. Medicine alone fails utterly to see the great work before it in this enlarged

realm of research. We shall never understand the diseases of man until we study also side by side with them the diseases of plants and animals. For this reason I welcome to-night most cordially our veterinary visitors and the presidency of Sir John Bland-Sutton, one of the rare links of comparative pathology. Let us learn that the pathological relations of the humblest animal or plant may serve to throw into light fertile general laws and principles. Every moment of our lives we are dependent upon unicellular plants for good and evil. Who would have supposed that the harvest of herrings would appear to depend upon the changes in the sunspots! Now principles cannot be parcelled out between the several aspects and departments of medicine. Some beginning with comparative pathology we are making by co-operating with our veterinary brethren on this occasion, but it is a small beginning; we need far more than this. Fusion between two fields of medicine so different as theirs and ours is impossible, but co-operation and constant mutual enlightenment on systematic lines is essential if we are to comprehend their work, and they in like manner ours; for evolution is one of the keys to pathology as to biology. It is with the greatest anticipation of such a renewal of medicine that I have heard, on some such lines as these, of the election of a committee of which Sir David Prain is the chairman. This is one of the ameliorations we owe to our harsh and cruel schoolmaster tuberculosis. Specialize we must, especially in practice; but it is the place and function of the universities to counteract this narrowness by a wider outlook and by a clear-eyed faith in the results—some ready, some deferred—which we shall gather in if we work together in an endeavour each from our own side to throw cross-lights upon the researches of workers in other departments of medicine. Until we establish institutes of comparative pathology our science and art will tarry on the way.

Dr. A. C. INMAN

said that the scientific study of tuberculosis became possible when in 1882 Koch discovered the causative agent of the disease. The distinction between the human, bovine and avian types was another advance and had allowed them to get some valuable knowledge as to the sources of infection and as to the relative importance of infection from man to man and from the consumption of food-stuffs contaminated with bacilli of the bovine type. In this country the study of the types of bacilli infecting man had been very carefully undertaken and they owed to the Royal Commission on Tuberculosis, and more especially to the extended work of Dr. Stanley Griffith and Dr. Eastwood, an accurate knowledge of the relative frequency of infections by the human and bovine types in the various forms of tuberculosis.

Age period	Number of cases	Type of infection				Percent. bovine
		Human	Bovine	Human and bovine	Atypical	
0 to 5 years ...	196	127	65	2	2	34.2
5 to 10 " ...	265	189	70	1	5	26.8
10 to 16 " ...	127	105	16	—	6	12.6
16 and upwards ...	341	313	18	2	8	5.9
	929	734	169	5	21	18.7

It would be seen, from a perusal of these publications, that consumption was nearly always due to infection by bacilli of the human type. The following were results of sputum cultures:—

	Number of cases	Human	Bovine	Atypical	Per cent. bovine
All ages ...	212	205	3	4	1.41

whilst the bacilli recovered from glands in the neck occurring in children during the first decade of life were in the majority of cases of the bovine type:—

Age period	Number of cases	Human	Bovine	Per cent. bovine
0 to 5 years ...	14	2	12	85.71
5 to 10 " ...	29	10	19	65.51

These studies had shown them the importance of taking steps not only to prevent infection from man to man but also to prevent the consumption of food-stuffs contaminated with bacilli of the bovine type.

Evidence obtained from the post-mortem examinations had shown them that under the age of 18 years tuberculosis was relatively uncommon but very fatal, whilst in adults it was common but largely latent and non-fatal.

	Number of post-mortems	Free from tuberculosis	Tuberculous	Per cent.	Fatal tuberculosis	Per cent.	Non-fatal tuberculosis	Per cent.
Subjects under 18 years of age ...	88	73	15	17	11	73.3	4	26.7
Adults ...	420	29	391	93	110	28.0	281	72.0

(After Et. Barnet, *Bull. de l'Inst. Pasteur*, 1911, ix.)

Another important fact learnt from post-mortem examinations was that the healing of a tuberculous lesion consisted in the throwing up of a defensive barrier and the shutting off, rather than the extermination of, the bacilli. Fully virulent living bacilli might be recovered from old "healed" tuberculous lesions even if these had undergone calcification (Rabinovitch, Barnet).

v. Pirquet's testing of 693 clinically non-tuberculous children with the cutaneous tuberculin test confirmed the findings of the post-mortem room. By the age of 10 years 35 per cent. reacted positively, and by the fourteenth year the percentage had risen to over one half (55 per cent.).

The observations of Franz on apparently healthy soldiers of (1) a Bosnian regiment recruited from a district where tuberculosis was rife, and (2) a Hungarian regiment recruited from a district poor in cases of tuberculosis, bore repeating because of their importance in connexion with the incidence of tuberculous infection in young adults and the value of the tuberculin test in the diagnosis of tuberculosis.

Regiment	Date of inoculation	Number of men inoculated	Reaction	During the three years' service were discharged through death, ill-health, or excessive leave due to—		
				Tuberculosis	Suspected tuberculosis	Other diseases
Bosnian Infantry Regiment No. 1	1901	400	+ 245 (61 per cent.) - 155 (39 per cent.)	17 (8 deaths) 5 (4 deaths)	22 25	10 7 (1)
Ditto	1902	323	+ 222 (68.8 per cent.) - 101 (31.4 per cent.)	13 (6 deaths) 4	28 (1) 13	7 (2) 5
Infantry Regiment No. 60	1902	279	+ 108 (38.7 per cent.) - 171 (61.3 per cent.)	4 3 (2 deaths)	4 5	8 12
Total	—	1,002	+ 375 - 427	34 (14 deaths) 12 (6 deaths)	54 (1) 43	25 (2) 24 (1)

To effectively eradicate a disease from man it would seem necessary to have a certain preventative against the infection. This, unfortunately, they had not got. But they did know the sources of infection and it was their duty to protect every one from such sources. It was distressing, under the circumstances, to read in Dr. Paterson's book the statistics culled by Dr. Sutcliffe, of the Ipswich Sanatorium, on the use of the sputum flask by tuberculous patients in this country as recently as 1918. Of patients admitted to the sanatorium on the advice of medical men 93·75 per cent. had sputum before admission. In 57·77 per cent. bacilli had been found previous to admission. Only 8·88 per cent. of those with sputum arrived at the sanatorium with a flask. Further, as Dr. Paterson pointed out in the same book, the control of milk, butter and cheese could be much more efficiently carried out than was the case even to-day.

In the absence of a certain preventative against infection they urgently required the following desiderata:—

(1) A method of diagnosing the disease in its earliest stages.

(2) A successful method of treating the disease.

(3) A method of ascertaining that the disease was cured.

(1) In the case of tuberculous infection they had, as yet, no certain means of diagnosing the disease in its earliest stages.

Owing to the large number of apparently healthy persons who gave a positive reaction, the tuberculin test had proved to be of but limited value in the early diagnosis of the disease.

The demonstration of tubercle bacilli in the sputum only became possible when the tuberculous ulcer communicated with a bronchus—i.e., the bacilli were not demonstrable in the earliest states of the infection. The great value of this test, however, could not be too strongly insisted upon from the point of view of the public health. It should be possible to examine the sputum of all patients who consulted a doctor for cough with sputum, whatever physical signs or symptoms they presented. Even to-day it was not uncommon to find numerous tubercle bacilli in the first sample of sputum examined for a patient who had been under medical treatment for months. He had even known persons applying to the Brompton Hospital to have their sputum examined because a doctor had told them there was no need for the examination; he could call to mind two such cases in which tubercle bacilli had been present in the very first sample brought to the hospital. From the patient's point of view, the examination was one of very considerable importance, for when tubercle bacilli were present in the sputum, the tuberculous focus in the lung was in communication with the outside world and was liable to become contaminated with bacteria other than the tubercle bacillus. As would be seen from the following table summarizing the results of an investigation into this matter he carried out in 1912, secondary infections were by no means uncommon in "open" pulmonary tuberculosis:—

	Febrile cases		Afebrile fever
(A) Infection by tubercle bacilli and secondary organisms	28 (87·5 per cent.)	...	13 (51·1 per cent.)
(B) Infection by tubercle bacilli alone	4 (12·5 per cent.)	...	10 (41·6 per cent.)
(C) Infection by secondary organisms alone	0	...	1 (4·1 per cent.)
Totals . . .	32		24

It would, then, appear to be an urgent matter to place the patients in as pure an atmosphere as possible and away from congested areas in which

the air was liable to be polluted with catarrhal micro-organisms. It was very striking to contrast the bacterial flora of sputum in London with that of patients living in pure country air. He believed that what good results were to be gained from the so-called open-air treatment of pulmonary tuberculosis was largely to be attributed to the limitation of the sources of secondary infections.

In 1904 Sir Almroth Wright suggested the use of the tuberculo-opsonic index as an aid to the early diagnosis of tuberculous infection. The technique was fraught with many difficulties, and its use as a routine measure in a large institute constituted a tremendous strain on the individual who carried out the test. An analysis of 250 cases of doubtful pulmonary tuberculosis performed in the routine laboratory tests of the Brompton Hospital was as follows:—

Cases without tubercle bacilli in sputum	Number of cases	Positive	Negative
Clinically tuberculous disease ...	56	48 (85.71 per cent.)	8 (14.28 per cent.)
Doubtfully tuberculous disease ...	134	91 (67.91 per cent.)	43 (32.08 per cent.)
Clinically non-tuberculous disease	60	4 (6.66 per cent.)	56 (93.33 per cent.)

In 100 cases with a positive index and no tubercle bacilli in the sputum special care has been taken over a subsequent period of about two years to try to find tubercle bacilli by numerous examinations of the sputum. In fourteen cases tubercle bacilli had been found, confirming the diagnosis. In a small series of cases, doubtfully tuberculous, and admitted to the Hospital for diagnostic purposes, the tuberculo-opsonic index test and the complement-fixation test had been carried out in the case of each patient.

In 21 out of 30 cases the two tests had agreed 70 per cent.

In 5 out of 30 cases tuberculo-opsonic index positive, complement-fixation test negative, 16 per cent.

In 4 out of 30 cases tuberculo-opsonic index negative, complement-fixation test positive, 13 per cent.

In a series of forty-two cases at the King Edward VII Sanatorium, Midhurst, Dr. Radcliffe and Dr. de Wesselow had made a similar observation.

In 32 out of 42 cases the two tests had agreed, 76 per cent.

In 7 out of 42 cases tuberculo-opsonic index positive, complement-fixation test negative, 16 per cent.

In 3 out of 42 cases tuberculo-opsonic index negative, complement-fixation test positive, 7 per cent.

Further work was required to enable them fully to understand the mechanism of the test, indeed such work was already being undertaken. No stone must be left unturned to find a reliable aid to the early diagnosis of tuberculous infection.

In 1913 an investigation had been carried out at the Brompton Hospital on the value of the complement-fixation test as an aid to the early diagnosis of tuberculous infections. The great help of the Wassermann test in the diagnosis of syphilis had led to hopes that a similar test might be of use in the diagnosis of tuberculosis. Besredka's antigen had been used, and though the results were encouraging it was found that the antigen was not truly specific, for positive reaction was obtained with syphilitic, non-tuberculous sera. In a series of 107 consecutive cases admitted to Dr. Bosanquet's wards the blood had been sent to the laboratory for an examination, and Dr. Bosanquet independently recorded his diagnosis after due clinical observation. There was remarkable agreement in the diagnosis.

Clinical diagnosis	Number of cases	Complement-fixation test	
		Positive	Negative
Clinically tuberculous ...	70	67 (95.6 per cent.)	3
Clinically doubtful ...	11	4	7
Clinically non-tuberculous ...	22	4 (doubtful) *	18 (81.8 per cent.)
Tuberculosis, non-pulmonary	2	2	—
Apical fibrosis in children ...	2	1 (doubtful) *	1
Total ...	107	78	29

* Incomplete hemolysis with undiluted serum.

In 1920, seven years after the patients' blood had been examined, he had tried to find out, through the good offices of the lady almoner (Miss Marx), in spite of the fact that over four years of war had intervened, what had happened to those patients who had had no tubercle bacilli in their sputum at the time of the blood-test. Only twenty-nine cases could be traced:—

Complement-fixation test, 1913	Died of pulmonary tuberculosis	Died	1920	
			Unit	Fit
Positive ...	6	1 (? cause) ...	1 ...	7 (3 treated at Frimley)
Negative ...	0	2 * ...	2 † ...	10 (2 treated at Frimley)

* 1 cancer, 1 meningitis.

† Both asthma.

McIntosh and Fildes, who had had a very extensive experience of the Wassermann reaction and had succeeded in improving that test to a remarkable degree, had suggested in 1914 the use of a fresh suspension of living tubercle bacilli as an antigen in the complement-fixation test for tuberculosis. Since the war investigations on the value of such an antigen, its sensitiveness, its specificity, had been instituted at Brompton. Decided improvements in the technique had been made. The results were distinctly encouraging and the test promised to be one of real utility. But before any considered pronouncement could be made on the subject further research was needed, more especially with regard to the specificity of the reaction, and to the state of activity of the lesion in those cases in which the reaction was positive. Infallibility could not be expected of any biological test, and it was doubtful whether, seeing that the general population of this country was largely tuberculous, such tests could ever occupy quite the position of practical utility in the diagnosis of tuberculous infections as the Wassermann reaction did in the diagnosis of syphilis.

(2) There was no known cure for tuberculosis.

He did not propose here to pass in review the various treatments advocated for the cure of tuberculous infections. He would, however, venture to reiterate his belief in the importance of the principles of auto-inoculation of bacteria and their products enunciated by Sir Almroth Wright. His (Dr. Inman's) studies in the laboratory, the treatment of individual cases of tuberculosis with a tubercle vaccine, the observation and study of a collection of cases treated by carefully graduated exercises by his friend, Dr. Paterson, everything he had been able to observe during the past fourteen years, had convinced him that in principle the views expounded by Wright in his "Studies on Immunization" were fundamentally right. And as regards the treatment of tuberculous infections he regarded it as a lamentable fact that the education of medical men in the all important field of immunology had, hitherto, been so deficient that some of the most valuable gleanings of science had fallen on deaf ears because the mind was uncomprehending. This was not said in any spirit of reflection of honesty of purpose. Admittedly there existed lacunæ in their

knowledge, there were deductions from their experiments which were false, but had a sufficient number of workers been able to realize the importance of the step taken in advance by the researches of Wright, they would by now have advanced far on the road, at all events, of knowing what were to-day the necessary limitations of their power over tuberculous infection once it had become established in the human body.

As the result of laboratory experiments the importance of absolute immobilization of a tuberculous focus from which excessive auto-inoculations were proceeding received scientific confirmation of the value of "rest," on which Hilton had years ago written a text-book. Paterson had found that the only method by which he could overcome an artificially produced, or spontaneously occurring, excessive auto-inoculation was by "absolute rest"; and to-day, when possible, they went further, and they immobilized the lung by putting it out of action (artificial pneumothorax).

Further, the revelation of a rich content in antibodies in certain pleural effusions had led Perkins, Young and Meek to inject such fluids for therapeutic purposes in seriously infected cases of pulmonary tuberculosis with encouraging results.

Lastly, might he reiterate his belief that the intelligent administration of tuberculin and vaccine prepared from secondarily infecting microbes might still serve to convert a seemingly hopeless outlook in some cases into one of so great amelioration, that life for the patient became tolerable and even enjoyable? He asked this the more readily since in all cases he had so treated the original prognosis had been pronounced by men of the highest standing in their profession.

(3) No certain means of ascertaining when a tuberculous infection was cured as yet existed.

In this connexion he would point out that science had given them methods which to-day, in his opinion, were worthy of serious trial. First in importance came the vital capacity test worked out by Professor Dreyer. It was interesting to note that so long ago as 1846 Dr. John Hutchinson, as the result of careful measurement of the height of individuals, had shown that cases of pulmonary tuberculosis exhibited a vital capacity distinctly inferior to what he considered normal. Dreyer had been enabled to demonstrate that Hutchinson's results failed to show the true relationship which vital capacity bore to certain other body measurements. As the result of the most accurate measurements, Dreyer had also been enabled to establish definite relationships between vital capacity and body surface, body weight, stem length and chest measurement, and to show that vital capacity might be expressed by means of the formula

$$\frac{W^n}{VC} = k, \text{ where } n \text{ was approximately } \frac{2}{3}, \text{ or, more accurately, } 0.72.$$

In a preliminary series of 150 cases of pulmonary tuberculosis weighed, measured and tested by Dr. Burrell at the Brompton Hospital in London, Professor Dreyer at Oxford, by calculation of the figures sent to him by Dr. Burrell, was able to classify these persons as normal individuals, or as examples of mild, of moderate, or of severe pulmonary tuberculosis in practically absolute agreement, as afterwards appeared, with the clinical diagnosis and classification made at the time at Brompton.

In proved tuberculous cases he (Dr. Inman) believed that a series of blood examinations as regards the Arneth count might prove to be of distinct value in the testing of a case as regarded arrest of the disease. Dr. Treadgold, working in his (Dr. Inman's) laboratory, came to the conclusion that a left

shift under 200 in old cases of "clinical arrest" was suggestive of recurrence and called for minute and careful re-examination.

Lastly, he would urge that a record of the serum reactions, quantitatively estimated, should be kept of all cases evacuated from sanatoria as "clinically arrested." So far as his observations went, most of the patients so discharged were probably still in need of treatment, and their lesion was still in communication with the blood and lymph stream. The verification of this might lead to a prolongation of treatment and a diminution in the number of relapses.

Dr. HALLIDAY SUTHERLAND

said that an increase of knowledge regarding the details of tuberculosis could never lead to more than partial success in the task of eradication unless there was agreement concerning certain general principles. Since the discovery of the tubercle bacillus medical opinion on the ætiology of the disease had swung from one extreme to another. If asked the cause of tuberculosis, the majority of people would answer "the tubercle bacillus." That answer was wrong. Tuberculous infection was ubiquitous, and after middle life practically everyone was infected. If the tubercle bacillus was the cause of the disease—using the word cause in its true sense—then mankind would have been decimated long ago. Tuberculosis as a disease was produced by two factors— infection and resistance of the tissues. The relation of these two factors was shown in the animal experiments of Trudeau in 1885. When resistance was unimpaired it was difficult to infect either a man or an animal, and when man lived under conditions in harmony with nature tuberculosis was a rare disease. Even to-day there were primitive races free from tuberculosis, and in the south of Spain amongst the fighting bulls living on the open plains tuberculosis was very uncommon, although domestic cattle in the same country were notoriously tuberculous. Such was the influence of environment on resistance. If resistance was unimpaired, either a massive dose of bacilli or prolonged exposure to infection was necessary for the development of the disease, and it was easier to induce the disease in a starved animal than in one well fed. To eradicate the malady it was necessary to raise or to maintain resistance, and to prevent infection.

As the bovine tubercle bacillus had been recovered in over 50 per cent. of cases where tuberculosis attacked the glands, bones, and joints of children, it was probable that some 10,000 children died every year in consequence of drinking tuberculous milk. Sir John McFadyean had said that to eradicate the disease in cattle it would be necessary, amongst other things, to slaughter 1,000,000 animals. That was not the experience of the American Government. By the Bang system tuberculosis could be eradicated from a herd within seven years, and it was only necessary under that system to slaughter the animals having advanced disease. As tubercle bacilli were present in the milk from animals whose udders were not affected, the Tuberculosis Order of 1912 would only check the gross infection of milk, and could not secure a tuberculosis-free milk. There were two extreme views on the question of tuberculous milk, and in attempting to reconcile these extremes by adopting a neutral attitude Professor Cummins had involved himself in certain very obvious contradictions. Professor Cummins deprecated the gross infection of milk, welcomed the Tuberculosis Order, and hoped that we should benefit by drinking the slightly infected tuberculous milk that would continue to exist after the Order was put in force. It was true that Dr. Brownlee had shown

the chronic type of pulmonary tuberculosis to be correlated with milk, but there were many other factors with which it might be correlated. Those who believed in the benefits of drinking tuberculous milk should advocate the vaccination of children with attenuated cultures of tubercle bacilli. The dosage could then be controlled, and those who urged this plan would at least be logical. That plan would not be advocated. The work of Arloing had first shown that immunity conferred in this way was both partial and transient. Calmette more recently had shown that the resistance of an infected animal could be raised and prolonged by these measures. If Dr. Brownlee's views were correct then this partial immunity would lead to an increase in the number of chronic cases, whereby the amount of infection amongst the population would be increased. Those who played with the question of tuberculous milk would do well if they followed their opinions to a logical conclusion. Remarks by medical men on the advantages of tuberculous milk did a great deal of harm, not amongst the medical profession, who were able to assess their value, but amongst dairy farmers and the general public. These statements were seized upon by the trade and used as an argument against legislation, which, however imperfect it might be, had for its aim the preservation of the life and health of children. Professor Cummins had also said that the milk trade was in an unsatisfactory economic condition on account of the bulk of fluid milk and of the difficulties in transport, to overcome which he advocated dried milk. As dried milk was much more expensive than fresh milk this proposed remedy was obviously economically unsound.

By far the greatest source of infection was from human beings, and in order to eradicate the disease it was necessary to correct the faulty environment whereby resistance had been lowered, and to check the amount and spread of infection. It was impossible to alter the general defects of our civilization to any material extent, but it was possible to alter the environment of the individual patient. Unless this was done in the early stages of the disease the change came too late. That meant early diagnosis. Everyone would welcome the advances in bacteriology of which Dr. Inman had spoken, and to which he had contributed so much, but there was a real danger lest a type of practitioner should be evolved who relied solely on a laboratory for diagnosis and failed to use the senses that God had given him. In spite of many difficulties it was already possible by means of clinical methods, X-rays, and the tuberculin subcutaneous tests to make a firm and accurate diagnosis of tuberculosis months and even years before tubercle bacilli appeared in the sputum. A chair of tuberculosis should be created in every university, and competent clinicians, having special experience in this disease, should be appointed to teach the students.

Once the disease had been diagnosed the next step was to provide adequate treatment for patients in all stages of the malady. Sir Robert Philip's co-ordinated Edinburgh system provided for all contingencies. The tragedy was that the system had not been carried out on the lines advised by the Departmental Committee in 1912. Sanatorium results were bad because the sanatoria were filled with advanced and dying cases. When early cases were sent and kept for an adequate period the results were uniformly good. As tuberculosis was essentially a disease of civilization, there was no short cut to its control and eradication.

Professor F. HOBDAY

had no doubt as to the value, in any scheme for the eradication of tuberculosis, of collaboration between the medical and veterinary professions, as each was well acquainted in their respective everyday lives with the disease in all its forms. The question of clean milk certainly could not be settled except by combined action between the two.

In his original paper he had purposely generalized in various diseases communicable to man, with a view to emphasizing the importance of united effort on the part of the workers in human and veterinary medicine; but when, at the request of the members present, the discussion was adjourned and it was suggested that one of the subjects only should be taken, he readily acquiesced, and eradication of tuberculosis from man and animals was chosen. It was the subject which he had suggested as being of far too great importance to be grouped with others, one which must of necessity be taken by itself, and one about which every scientific worker, whether in the laboratory or clinical sphere, could say something. Particularly was it of importance just now on account of the new hopes which were being raised by the report of the work recently done on immunity by vaccinations, and here again the observations made upon animals must take first place. Much for mankind depended upon the results here to be attained, and the whole research was still a further corroboration of the advantage of collaboration between those who had expert knowledge of the normal habits of animals as well as man. Taking all the diseases originally mentioned in his lecture, and even if the cases of actual transmission were, as Sir John McFadyean had said, only enough for the average man to see once in three years or once in ten years, this was all the more an argument for keeping them out of the country, and it was all the more to their credit if they did this. What would be the position now if the veterinary profession had not done its duty in the past with regard to glanders and rabies? It was to the veterinary side of comparative medicine that the country owed this excellent position at the present time, and if they could find the way to do as much for tuberculosis of cattle as they had done for the eradication of glanders from horses they would again have rendered mankind a service. As regarded tuberculosis in cattle, it was possible to eradicate it by the aid of tuberculin if cost was no objection. It was the cost, together with the question of the milk-supply, which stood in the way. That bovine infection was a reality was shown by statistics brought forward that evening by Dr. Inman, who had told them that 18.7 per cent. of all cases were of bovine origin; that in tuberculosis of the glands of the neck of very young children the proportion went up to 85 per cent., and between 5 and 10 years of age 65 per cent., whilst another speaker had said that of this form of tuberculosis an average of 10,000 children died annually. He thought that the discussion and the interest shown by the mixed assembly of the medical and veterinary professions proved the truth of the last paragraph of his original paper: "that in the combat against disease the workers in human and veterinary science go over much the same ground, and that by working in unison much valuable time might be saved and much better results would be attained, than if each kept itself in its own water-tight compartment."

SIR JOHN MCFADYEAN

replied and moved the following resolution, which was seconded by Professor Cummins, and, upon being put from the chair by the President, was carried unanimously:—

“That the Fellows of the Royal Society of Medicine and Members of the Central Branch of the National Veterinary Medical Association, assembled in joint meeting, are of opinion that the prevalence of tuberculosis among cattle in this country continues to be a serious menace to the health of human beings, and that to counteract this danger the re-introduction of the Tuberculosis Order, which was suspended in 1914, is urgently needed.”

PROCEEDINGS
OF THE
ROYAL SOCIETY OF MEDICINE

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UNDER THE DIRECTION OF
THE EDITORIAL COMMITTEE

VOLUME THE FOURTEENTH

SESSION 1920-21

SECTION OF ANÆSTHETICS



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Section of Anæsthetics.

President—Dr. H. J. SHIRLEY, C.M.G.

The Psychology of Anæsthesia.¹

By DUDLEY WILMOT BUXTON, M.D.

SOME explanation of the title of this paper seems desirable. Psychology is defined in the dictionaries as "the science of the phenomena of mind—mental science" but as under anæsthesia the functions of the mind are commonly held to be out of action, it may appear inaccurate to formulate any connexion between the causation of the phenomena evinced by an individual under anæsthesia and psychology. However, I hope to be able to show that there are quasi-mental phenomena during narcosis. Any alternative title would have necessitated the employment of a long and cumbersome periphrasis or explanatory phrase which I venture to suggest is undesirable and even unnecessary.

In his "Metaphysics" Sir William Hamilton defined psychology as "the philosophy of the human mind, strictly so denominated is the science conversant about the phenomena or modification, or states of the mind, or conscious subject, or soul, or spirit, or self or ego." This extends the limits of psychology, and since the days of Hamilton biology has enabled us to accept a still wider concept of the sphere of psychology for we now accept that science as capable of enfolding experimental investigations of phenomena which cannot in any sense be regarded as being confined to the activity of the conscious mind. The materialistic school accept psychology as a science dealing perhaps with the pheno-

¹ At a meeting of the Section, held November 5, 1920.

mena of the conscious being, even although the Psyche is not in its view the Soul, or the Spirit or indeed the Self or Ego taken as an individual entity out of relation to its phylogenetic origin. Dr. G. W. Crile, whose work stands out as a bold attempt to explain the phenomena of man's life by a study of the cellular changes observable in his brain after physical work, and physical work is in his view the objective evidence of stimulation of the brain matter, offers us a definition of psychology. He suggests it is "a science of man's activities as determined by the environmental stimuli of his phylogeny and of his ontology." Such activities may be of the conscious or the subconscious mind.

I suggest that we are justified in believing that the older views about the mentality of a person under anæsthesia are inaccurate and need modification. Indeed I submit we are justified in postulating that the abolition of consciousness does not necessarily predicate the smothering of all emanations from the higher brain centres, although such emanations differ both in kind and degree with the depth of the narcosis.

The old concept of anæsthesia and deep narcosis was that the individual in such a state was practically in the condition of a frog whose brain has been destroyed. It was taught that the animal functions necessary for the persistence of life were preserved, but they were no longer subject to modification or under any sort of control by the brain centres. This view I submit we must now throw over.

Certainly many of the avenues which bring an individual into communication with his environment are closed under anæsthesia. How many I think we are at present unable to determine. The number of such closed doors and the extent to which some of them are capable of being left ajar, or, under sufficient peripheral stimulation, opened, is also matter for investigation. But supposing that the anæsthetized person is cut off from any relation with other individuals we have no evidence that he does not retain some degree of consciousness or, if one may be permitted the term, of subconsciousness. In such a state although he cannot functionate as an intelligent being or have any inclination to do so, he may under appropriate external stimuli or auto-stimulation bring about effects, which influence his personal welfare. How far we are justified in adopting such a view is open to question, but I think it comes fairly within the scope of psychology to investigate the matter or at least to carry out an inquiry which may throw light upon the question. This is no academic problem, it is

severely practical and its solution cannot fail to assist us in our everyday work as anæsthetists.

The tests of consciousness which are commonly accepted are certainly inexact and are only reliable in so far as they give evidence of the abrogation of certain reflexes; they give us no information concerning the persistence or absence of subconsciousness if such subconsciousness does indeed survive the employment of anæsthetics in their intensive application.

If I may interpolate a suggestion at this point which the use of the phrase "the intensive application of anæsthetics" invites, it may shed a little light upon the question of the persistence of subconsciousness.

The various anæsthetics in use differ in the degree or intensity in which they act. Accepting the usual abolition of reflexes as criteria of anæsthesia we recognize that Snow's third degree of narcosis—surgical anæsthesia—is a profounder condition of unconsciousness under chloroform than that brought about by ether, and this latter anæsthetic produces a deeper state than does nitrous oxide gas, although each has rendered the patient to outward seeming merely "anæsthetic." It may be a question of the depth of the penetration of the drug into the protoplasm of the cells of the nervous system. Even if this is a mere matter of physical and chemical interaction between the drugs and the protoplasm of the brain and other tissues it is not extravagant to suggest that anæsthetics may and do cause anæsthesia before they entirely abrogate subconsciousness.¹ Carpenter in his "Mental Physiology" gave some extremely interesting, and in this connexion, important instances of what he termed "unconscious cerebration." The individual's ego functionated with his higher cerebral centres, but did so without being aware of such activity. The usual effect of ratiocination was brought about, but the ratiocination was non-existent.

I am fully alive to the fact that psychologists may decline to accept my connotation of the terms subconscious and unconscious cerebration, and I readily admit that the use of them is open to grave adverse criticism, still I can discover no better words, and so I trust I may be forgiven, and, what is more important, that my meaning may be clear.

¹ Supporting this view are two observations. Persons who have been anæsthetized by chloroform are more obfuscated and take longer to resume their normal mental balance than when ether has been taken, and those who have inhaled ether recover less rapidly and are bemused for a longer time than is the case with patients who have been given nitrous oxide gas.

Then as to the proofs that such residuum of consciousness persists under certain degrees of narcosis—*anæsthesia*, *semi-anæsthesia* and so on. Such proofs are only presumptive and I propose to deal with them immediately.

The trend of modern thought is to recognize that the state usually designated "*consciousness*" is really an epiphenomenon. That throughout the nervous system there exists an "*awareness*." This in the higher centres we call *consciousness* but below these centres there yet exists this "*awareness*." It is revealed in the spinal cord by the reflexes with which we are familiar. Some years ago I published the results of some experiments which showed that under nitrous oxide gas ankle clonus could be elicited. The patient was unconscious but below a certain level his "*awareness*" was actively present, and being no longer under control the reflex developed. So it is fair to assume that in certain persons whose higher controls are more readily put out of action by *anæsthetics* there arises a variety of phenomena due to the "*awareness*" of the centres even where *consciousness* is temporarily lost. These phenomena are those which occur during *anæsthetization* of neuropaths, neurasthenics and so on. The truth of these statements has been shown by many cases of cord and brain injury met with in wounded soldiers, although so far as I know their relation to the problems of *anæsthesia* has not been recognized. The "*awareness*" of the centres reaches certain levels and according to the levels cut off so do the phenomena met with vary. If, as I maintain, we are able to alter the level of *consciousness* or "*awareness*" by *anæsthetics*, we bring about states similar to those arising through trauma affecting either the higher or lower centres. The "*awareness*" may and does persist in the lower centres while *consciousness* or "*awareness*" of the brain is lessened or lost. I am indebted to Dr. Henry Head for the term "*awareness*," which seems a better one than such expressions as *subconscious*, *liminal state* or *unconscious cerebration*. We need a word to express the residual state of activity of the parts of the nervous system when gross *consciousness* is abrogated or lost.

Crile would have us believe that a physical impress is made on the brain cells by the emotions, notably by fear which is the emotion with which our work brings us into most close contact. In his "*Origin and Nature of the Emotions*" he discusses these matters and compares the effects of emotions to those of trauma under *anæsthesia*. He writes "*Although no pain is felt in operations under inhalation anæsthesia, the nerve impulses excited by a surgical operation still reach the brain.*"

In this statement he is not in accord with the findings of Longet or of Waller based upon their classical experiments on the spinal nerves, since these observers recognize that anæsthetics act directly upon the nerves as well as upon the nerve centres. These are facts which even if they do not amount to proof are suggestive and these we may now consider.

My experience has forced upon me the need for an explanation of the nerve storms, and the bizarre phenomena arising during the induction and maintenance of anæsthesia in the case of certain types of subjects. For many years I had remarked that soldiers, whether officers or privates, were not only very difficult to anæsthetize but were prone to evince unusual and often dangerous phenomena both in "going off" and throughout the operation. Similarly I found neuropaths, highly nervous persons and that large class of patients whom we group somewhat unsatisfactorily in the category neurasthenics with babies and alcoholics resembled soldiers in being "bad patients." What struck me most was that the nervous folk, persons whom we are accustomed to consider as possessing an unstable nervous system, evidenced by presenting curious and troublesome nerve symptoms even although no definite disease of their central nervous centres existed, were liable to unusual phenomena both during induction and maintenance of anæsthesia. They appear to project their conscious nerve dyscrasia into the period of anæsthesia, so that nerve storms arose interfering with respiration and circulation and other functions. What I wish to indicate is that in these cases temperamental peculiarities became manifest even when consciousness was absent. One is tempted to add, even though consciousness was absent a residual sub-consciousness persisted and the higher centres cut off from the external world by the anæsthetic persisted in function and dominated those centres which were still active and necessarily so for the maintenance of life. Possibly such function was of a quasi-defensive character or arose through abolition or repression of phylogenic activities. Psychoanalysis may help us to explain these phenomena and to this I shall return.

In the categories of babies and alcoholics we have other factors with which to deal. In the first class there exists a notably unstable nerve centre equilibrium and a narrow margin between the zone of anæsthesia and the spread of narcosis to the degree of overdosing of the whole nervous system. Babies and young children are dominated by their phylogeny, their ontogeny being as yet hardly developed.

Alcoholics, I was at one time tempted to believe, were bad subjects because their tissues were more or less damaged by alcohol. This, however, I submit is a half-truth and does not explain why in their case the unusual phenomena of anæsthesia which are present resemble in a remarkable degree those which emerge in the case of neuropaths and neurasthenics. I think I overlooked, and possibly others have made the same mistake, that alcoholism is a disease grafted upon an individual whose nervous system is on the borderland of being abnormal. If such is a true deduction in their case we have to deal with patients who have both a nervous system obnoxious to such drugs as anæsthetics and who have lost their normal recuperative power owing to being chronically toxæmic and hence whose tissues have a lessened resistive power. It is an interesting fact that alcoholics are extremely prone even under profound anæsthesia, to move, to phonate and exhibit symptoms which may well be defensive or a revival of repressed phylogenic activities.

These observations being those of one anæsthetist might be open to the criticism that they do not fall into line with those of other workers, but that this is not so is shown by the experience of a large number of persons who have had to anæsthetize many soldiers during the Great War and who have placed their experiences on record.

We have more recent information about these men than about members of the civilian population and so it may be worth while to consider their case. In the first place it has to be remembered that the armies have been composed of many different types of persons; men alike only in being below middle life, men who though physically fit were often the subject of some nervous disability. We are told that one man who had had two attacks of insanity was passed as having a "slight defect" but not enough for rejection. Now my experience indicates that most of the men whether really fit or the subject of some nervous inefficiency are "bad subjects." They take a great quantity of the anæsthetic before losing consciousness, are prone to struggle, to fight, to be restless even after the ocular reflexes are in abeyance and are very liable to respiratory and circulatory crises even when there is not more than the usual degree of trauma. However unlike the poorly nourished neuropath who often evinces some untoward symptoms following the anæsthesia, they usually recovered consciousness normally. Some, however, passed through a stage of delirium resembling mania, and besides this show no unusual after-effects. Perhaps I should modify this statement in so far as to divide the new Army men into

two classes, those who resembled the units of the old Army in being physically fit and possessing good health and those who were rendered "fit" by an intensive training. This last type of men often showed severe after-effects.

We learn¹ that whereas no new psychoses were developed as a result of war stress (Weygant), war's excursions and alarms were liable to fan into flame any latent predisposition to nervous disease. Psychoses we recognize as arising through toxæmic conditions or from mental conflict (psychogenic), and whatever the origin of the state there can be no doubt that those who are the subject of some psychosis develop unusual phenomena when given an anæsthetic.

The view appears to be accepted and we owe our knowledge to the workers in psycho-analysis, that our mentality is a complex of derived, that is phylogenic, instincts and ontogenic or individual traits. The former are kept in repression under normal civilization but during war the primitive animal instincts escape and the fighter becomes a changed man from his former self in the conditions obtaining in civil life. A like change is engendered and favoured by acute illness, severe trauma, especially that of the head or spine, since these conditions, together with the unwise use of alcohol, cause loss of the habitual inhibition of the savage instincts of mankind. Another point of some importance is one noted by Read "that the necessary curtailment of free thought and action involved in Army discipline naturally leads to much repression." This repression at length calls for a vent for the lower instincts and an escape into the unbridled licence of savagery. Cannon has shown that intense emotions provoke adrenalism and we are probably correct in believing that the secretions of the endocrine glands other than the adrenals are also increased by similar stimulation. The soldier about to take an anæsthetic is usually under the dominance of fear and of other emotions, and he exercises severe repression so long as his controlling centres remain in control of his actions. He no longer has the support of "the herd" but experiences an exaggerated fear of what is to happen to him and the necessity for self-protection. The effect of the anæsthetic is to destroy the systems of restraints and open the flood gates of primitive instincts, in this case those which will liberate him from those who hold him, and he even endeavours to destroy them, since they are, for the nonce, his obvious enemies. As Dr. Ernest Jones has indicated,² the investigations of psycho-

¹ "Military Psychiatry in Peace and War," by C. Stanford Read, M.D.

² "War and Individual Psychology," *Sociological Rev.*, July, 1915.

analysis have shown that the influence on conscious life of these impulses (primitive inherited instincts) that are in a repressed state in the unconscious mind is of an unexpected importance and what is more that they are indestructible. Moreover the adrenalism to which reference was made above no doubt accounts for some of the abnormal states of the circulation so common in such cases.

We may sketch the mental picture in the mind of the fighter and recognize that it may provoke the outbursts of disconcerting activity under the anæsthetic. In some men it is the vivid recalling of recent experiences, in others it is the blurred impression of a phylogenic complex which carries the individual back to a primitive environment.

Are we justified in believing that this is the explanation of the abnormal phenomena during anæsthesia which develop in individuals of the classes we have considered?

It may be objected that there is a gulf fixed between the mentality of the soldier and that of the civil neuropath. However, a little consideration will indicate that such is not really the case. Similar results are reached in the two individuals although by different routes. The berserker rage of the warrior and the perverted mind state, whether conscious or subconscious, of the neuropath, are one and the same departure from the normal and as such cause similar phenomena under anæsthesia.

There is another and most interesting aspect of this question, the study of dreams which have occurred under anæsthesia and left a profound impression on the unconscious mind. The study of dreams which occur in association with anæsthetics sheds some light upon the psychology of this state and seems to support the contention that there is a period of liminal consciousness beyond the consciousness which passes into abeyance early in narcosis. Dreams are common with every kind of general anæsthetic but are not always remembered. The patient will say that they "had a lovely" or a "dreadful dream," but cannot recall it in detail. Many such dreams probably arise as the patient is resuming consciousness and if of a disagreeable character are usually the result of some perception of pain whether due to the concluding steps of an operation or to "after-pain." This is a common type with nitrous oxide gas inhalation and has little significance for us in the present connexion.

The pleasurable dreams fall into another category and are worthy of close investigation, so also are the dreams often called "horrors" which leave an indelible impress upon the mind, and are often recalled

at wide intervals of time under subsequent anæsthetizations. Among such dreams we can recognize types. The erotic, which is not infrequent with nitrous oxide gas or ether, less common with chloroform, can often be recognized by muscular movements which suggest orgasm. These occur when the patient is unconscious of his or her surroundings and leave the patient somewhat exhausted and in the case of women obviously disturbed if the anæsthesia has been brief and recollection of the erotic sensation is dimly present upon recovery. It is such dreams which form the basis of charges of assault often preferred in good faith against surgeon, dentist or anæsthetist.

I have been told repeatedly by men that they have had a "good time," meaning erotic dreams have lightened the tedium of anæsthesia. Those who enjoy the sensation of alcoholic exhilaration will tell that they have had a "splendid drunk," and their muscular movements during the stage of recovery suggest bacchanalian fancies and amatory hallucination.

I have met with different forms of dreams deeply impressed and either remembered or recalled. The importance of these is great. A person will have a dream under an anæsthetic which is so vivid as to amount to a subconscious experience, as it were an episode in another life. One recalls the case of John Addington Symonds. At the period of his mental storm and stress, I think when he was at Davos, his mind was perturbed by doubts as to the truth of revealed religion. Symonds was given an anæsthetic and under its influence he passed into what he describes as a kind of trance. The presence of The Almighty was revealed to him and The Voice said "It is I whom you deny." One need not labour the story, it is one of the type of constructive dreams which are very vivid and persist.

I had a patient who like a character in George Du Maurier's novel, "Peter Ibbetson," "dreamed true." She told me that every time she inhaled nitrous oxide she dreamed of a friend, and that she felt as if she was in the society of this friend; she remembered what she had dreamed before and, as it were, took up the thread of the narrative and continued it in each successive dream. I regret I have lost touch with this patient and so am trusting to my memory concerning it and to a scant note made at the time when I was told the story. In another case the patient informed me that she always had "a delightful dream" which was repeated on each occasion when she took gas. The details she kept to herself.

In these dreams we find a persistent impression left upon the

unconscious mind but capable of being revived under certain presumably similar conditions. The best example of this I have met with was in a highly intellectual man, a teacher at one of the old universities, highly nervous and neurotic. He had to have all his teeth removed but could not face the ordeal. Finally his sister, also an intellectual, who had been a patient of mine, suggested he should consult me. His history was typical of many such cases. In childhood he had been given an anæsthetic and had had an exceedingly bad time. The recollection of that experience was an abiding horror. When I saw him it was obvious that his condition was a serious one, he was being poisoned, but he refused an anæsthetic and distrusted any local analgesia. Luckily his sister had impressed him with my ability to help him. He consented to be re-educated as regards the effects of nitrous oxide provided I promised to desist from any administration when he felt the old horror was gripping him. By repeated administrations, at first brief and stopped before unconsciousness, I was able to build up his confidence and belief in the efficacy of the anæsthetic and to submerge the old associated horror beneath the new and agreeable sensation. Of course the case of Mr. A. is an extreme one but it is certainly probable that many patients who exhibit maniacal fear, a very dangerous thing during induction of anæsthesia, do so as a result of the revival in their subconscious state of preceding and possibly, forgotten experiences which had deeply scarred their subconscious mind.

I think these cases, and especially those in which a dream is repeated in identical detail at wide intervals of time, indicate that in anæsthesia we are dealing not only with ordinary consciousness as tested by motor reflexes but with the subconscious, hidden mind, access to which is made possible again and again when the use of an anæsthetic is invoked on successive occasions.

In some cases patients who have lived abroad years before taking an anæsthetic have, during the induction period of anæsthesia, commenced to speak in some native dialect, uttering phrases which had not passed their lips for years. Here we have no associative nexus between the anæsthetic and the harking back to the experiences of bygone years, but I think we have evidence of inhibiting the repression which the new conditions of life in England would naturally impose. Carried further as it is in many persons the removal of repression leads to furious struggling, protective efforts, as of one attempting to ward off the attacks of his enemies. In soldiers, as has been said, this is very common.

How far anæsthetics can penetrate the veil of the unconscious mind and protect it from obnoxious impressions has yet to be determined. The power to do so is limited, I think, by the individual psyche. In the classes to which I have particularly referred those who are the subject of some psychosis, the neurotic, the neurasthenic, the toxæmic, and generally persons of a poorly developed and unstable nervous system, the anæsthetic awakens both phylogenic and ontogenic traits more readily than is the case with the stormless individual with an irreproachable central nervous system. In the members of these classes we expect not only the muscular storms but we look for interference with the controls of circulation and respiration with their associate and definite dangers. It becomes a practical problem for us to solve, how can we best deal with such persons, I mean in the sense of establishing prophylaxis. And here one seeks for the assistance furnished by the experience of others. I have no doubt that the subject which I have attempted to introduce to you is worthy of extensive study and research. We should receive valuable aid from the neurologist and from the employment of psycho-analysis we may obtain light on our problem. The danger is that because we now get excellent results even with neuropaths we may relegate the study of psychology to the limbo of the unnecessary developments of thought.

It must, however, not be lost sight of that anæsthetists seldom have opportunities unless they make them, of following up abnormal cases for months or it may be for years, and so miss the profound psychic developments which have their rise in an anæsthesia. We are not infrequently told that such and such a patient must not be given an anæsthetic because of a serious upset and prolonged illness which followed an operation under an anæsthetic which took place some years ago.

Such a case is one for study, not one to be refused the benefit of general anæsthesia, since this form of narcosis is peculiarly useful in the case of psychoses and neuropaths. The study made, we should be prepared by knowledge much of which has yet to be gathered, about the best form of anæsthesia and method of its production with detailed attention to the patient's environment and preparation. This preparation should often be prolonged and should be directed not only to the needs of the body but also to those of the mind. To take a concrete example: Crile's "stealing of the thyroid" is accomplished by a method admirable in its conception since it deals with the patient's mental as well as his physical requirements. I have been greatly struck by a

remark of the lady who appears to give many of this surgeon's anæsthetics. She insists that a definite and formal part of the induction scheme she pursues is reassurance of the patient: the mind is supported, fears are banished and a sense of well-being engendered by the determined efforts of the anæsthetist while the anæsthetic is steadily given, and given without hurry or impatient intolerance of a nervous person's natural trepidation.

How real is the danger of injudicious methods of administration and of a faulty choice of agents is shown by the following facts: Sir George Savage has told me that patients who are or have been insane not infrequently develop mania after ether. I have known transient maniacal delirium to arise in patients who at the time of the induction were apparently sane, and I have on subsequent occasions substituted chloroform given with oxygen in place of ether and with satisfactory results. I am convinced that every ounce of ether saved by limiting the dose during maintenance of anæsthesia *after complete anæsthesia is obtained* is a step towards lessening post-anæsthetic mental disturbance. I know of at least one case, and others have been noticed, in which acute mania lasting for some weeks has followed the operation of the radical cure of hernia undertaken under a local analgesic. The patient was a medical man of assured sanity, but I do not know whether he had any tendency to a psychosis.

When spinal anæsthesia is employed and no preliminary injections of alkaloids are given, and when a general anæsthetic is not adopted concurrently with the blocking of the spinal nerves, a high degree of psychic shock appears in many cases. The effects of this persist for a considerable time after the operation is completed. This state seems to be in some way analogous to the effect of a general anæsthetic given to persons the subject of a psychosis. In the one case the apprehensive centres are wholly unprotected from the perturbation arising from fear, in the other it would seem that these centres are ultimately thrown out of action but during the period of induction they are not completely protected and so they activate to the extent that they cause the phenomena of struggling; nerve storms arise which interfere with the respiration and circulation and so mar the usual even procession of the induction.

At present we possess certain methods which my experience of their use, extending over some years, leads me to believe are satisfactory in cases of individuals who fall into the categories of psychopaths and neuropaths. The use of alkaloids before inhalation or colonic etherization is unquestionably valuable.

There is a common, but I think mistaken, impression that morphine and atropine subserve best the ends in view. It is common experience that the dose of morphine usually given, namely, $\frac{1}{6}$ gr. one hour before inhalation is insufficient to produce the requisite drowsing of the patient and so larger doses are ordered. This is certainly true in the case of soldiers. Now these large doses of morphine, even if they achieve the aim we have in view, exercise a very deleterious effect upon the nervous system and set up paresis of the respiratory centre to a dangerous extent. If, however, scopolamine is added to the morphine and atropine a more stuporous effect is arrived at without damaging the functions of respiration. It is true that scopolamine acts in some ways similarly to morphine, but we must remember that it belongs to the atropine group and so while it drowns the senses it stimulates the respiratory centre. Drugs in combination act in some ways synergically, in others they are in antagonism, and it is so in the case of atropine, morphine and scopolamine. Another practical point is that we require the optimum effect of these drugs when the induction is commenced. If it comes on later it is a danger and so at least an hour should elapse between the giving of the hypodermic and the administration of the anæsthetic.

Another and equally important matter is that the patient should be ensured a good night's rest before the operation. The use of a hypnotic may be undesirable in some ways, but its benefit is great in others and these, I submit, are more important. After this night's rest the patient should not be disturbed unless it is absolutely necessary for him to have enemata or be given indigestible beef tea.

Thus in brief is the line of treatment I suggest; it will, no doubt, be modified in the hands of others and possibly with advantage.

Although not strictly a matter for the anæsthetist it may be noted that gentle surgery protects the patient from reflex dangers, while some form of blocking the centripetal nerves by analgesics, as in Crile's anoci-association method, probably protects the patient from some shock effects, although, of course, we cannot entirely abrogate these in abdominal or thoracic operations.

There is another practical point which calls for some mention. I, no doubt in common with other anæsthetists, have noticed that if the induction is hurried or performed without due attention to detail so that vomiting or other undesirable occurrence happens, also when the operation is commenced before absolute anæsthesia has been obtained for some minutes before the surgeon commences his work, the whole course of the anæsthesia is unsatisfactory. Do what you will it is marked

by an uneven level of narcosis, vomiting or retching is constantly imminent and disturbances, usually vagal in origin, are common. Throughout the anæsthesia anxiety and dissatisfaction obtain, while at its close after-effects usually occur, severe in character and peculiarly prejudicial to the patient. I believe this trouble arises through no initial and complete control having been obtained over the higher centres; consciousness may eventually be lost, but the influence of the unconscious mind is aroused and for some reason, at the nature of which we can only guess, its effects persist and are hardly abrogated. To recognize this state is to suggest its treatment, whether we admit the validity, the suggested causation, or regard it as fanciful.

DISCUSSION.

Mr. A. L. FLEMMING (Bristol) said that he hoped that the paper would have the effect of stimulating research in the direction of what depth of anæsthesia was most suitable under various circumstances. This was a vital question which had been somewhat neglected, with the result that there was a danger of overlooking the advantages of light anæsthesia on the one hand and the disadvantages of deep anæsthesia on the other.

Dr. MILLAIS CULPIN said that the various stages of artificial anæsthesia could be compared with conditions that sometimes arose from psychological causes. That variety of "shell-shock" (not concussion) which took the form of torpor so profound that external stimuli passed unheeded resembled the deep stage of anæsthesia, and was now regarded as entirely mental in origin. The lighter stages of anæsthesia could be paralleled by other mental conditions. The struggling stage resembled an anxiety dream and, like a dream or some hysterical fits, might be a distorted reproduction of an emotional episode. One would expect struggling to occur, especially with psycho-neurotic subjects, and Dr. Dudley Buxton had shown that this expectation was fulfilled. An extreme dread of anæsthesia could be removed by suggestion and persuasion, as had also been shown, but the theoretically correct procedure would be some form of mental analysis which would reveal and remove the cause. The speaker remembered a hospital patient who on the mere application of a facepiece started up in terror and protested that he could not stand it. His protests were so emphatic that the operation was abandoned, but he obtained admission to another hospital, and there went through the same performance with the same result. The man was probably a psychasthenic, and some phobia was stimulated by the application of the facepiece; ashamed of his weakness, like many psychasthenics, he plucked up courage for a second attempt, and again gave way at the critical moment. He deserved more sympathy than he received, and was really in need of psychological treatment.

Dr. BELLAMY GARDNER said there was much to be learned from the study of a patient's subjective sensations during induction and recovery from anæsthesia. It taught them, as administrators, to project themselves more thoroughly into the patient's feelings while passing through these stages, and to guide him by suitable verbal suggestions while these could be appreciated. He saw an analogy between this study and the use of the ultra-rapid films on the bioscope by which an analysis of movements into their component factors could be visualized.

Mrs. DICKINSON BERRY and Mr. E. C. HUGHES also took part in the discussion.

Dr. DUDLEY BUXTON, in reply, said that there was some undoubted difficulty, as Mr. Flemming (Bristol) had said, in gauging the depth of narcosis in the stage of anæsthesia. Each case needed study, and in the instance of neuropaths and psychopaths this was peculiarly difficult and yet especially important. One could not rely upon ocular phenomena as a test in these cases. The same was true of children. Dr. Culpin believed that there was truly a similarity in the normal horizon of neuropaths and psychopaths and persons in anæsthesia, and this was his (Dr. Buxton's) contention. It was difficult to estimate how far amnesia came into place in the post-anæsthetic state. It had been suggested to him by the father of a patient that pain as evinced by the *facies* of the patient, although felt under nitrous oxide, was not remembered, and so not felt as a persistent impression. That amnesia was in fact not all the story was, he believed, uncontrovertible. Patients would to all seeming recover from chloroform or ether and converse rationally, would refer to the operation, but more commonly to some matter about which they had been anxious at the time. Then they would doze off, and on awakening be totally unaware that they had seen the medical man or held conversation. Their state was a puzzling one, although probably most observers would regard amnesia as the explanation. The dominance of the idea at the moment when anæsthesia was about to be administered unquestionably existed and influenced the mind of the patient. He knew of cases proving this. The late Mr. Bailey told him that he went to a patient of Lord Lister's (then Sir Joseph), who proposed firing the skin over the spine. The gas cylinder proved to be empty, but Mr. Bailey assured the patient that he would feel no pain, and applied the gas mask. The patient felt no pain. A lady was given eau de Cologne on a handkerchief, but believed she was inhaling chloroform. She collapsed and died. In a third case a patient declined gas at a dentists', had a firm tooth removed, and averred she felt no pain as she had prayed fervently during the operation. As Dr. Culpin suggested, Dr. Buxton could have tried psycho-analysis with Mr. A. He did not however entertain the idea at the time, but he thought the suggestion a valuable one. His experience of exophthalmic goitre cases did not coincide with that of Mrs. Dickinson Berry. Although he had not had serious trouble with them, and he had anæsthetized quite a number, he would certainly put these patients in the class of neuropaths, and say that they needed especial

care. Dr. Berry's experience abroad pointed to the fact that different races reacted very differently to anæsthetics, some being nervous, some phlegmatic. He thought the neuropathic was an individual rather than a racial peculiarity. As to the number of persons who dreamt under anæsthesia, his questions had been put to practically all patients for some years, and the result convinced him that most persons dreamt, but that few could recall their dreams. The exact proportion he was unable to furnish. He agreed with Mr. Hughes that the neuropath resembled the alcoholic, and for reasons which he had stated in his paper. It was quite true that morphine given before an anæsthetic restricted the intake per unit of time, but although a slower induction period might be necessary, yet the requisite depth of narcosis could ultimately be obtained.

Section of Anæsthetics.

President—Dr. H. J. SHIRLEY, C.M.G.

Anæsthetics in the Plastic Surgery of the Face and Jaws.¹

By E. S. ROWBOTHAM, M.R.C.S., L.R.C.P., and
IVAN MAGILL, M.B.

THE cases upon which this paper is based are all war injuries and represent about 3,000 anæsthetics administered by us at the Queen's Hospital, Sidcup. With the exception of an occasional excursion to the ribs and limbs for pieces of cartilage, bone, or skin for grafts, the operative work is entirely confined to the facial and jaw regions. The cases are practically all clean ones, and the importance of the anæsthetist's manipulations not transgressing the rigidly aseptic technique which all plastic work demands will be apparent. He must put his patient under, fix in his airways and tubes, and then get out of the way until the operation is over.

TYPE OF PATIENT.

The patients are men of military age, most of them "war-time" soldiers, recruited at a period when the demand for men eclipsed to some extent the physical standard. The shock of severe wounds and repeated operations has in many cases considerably reduced their stamina and some of them do not stand operation at all well.

On the whole there are few chest complaints, but a considerable number show some degree of cardiac dilatation and irregularity. This latter may possibly be due to excessive cigarette smoking, as may also the abnormal irritability of their nasal and laryngeal mucous membranes to ether vapour. The men have nearly all had many operations; the average case which comes into the theatre now is about to have his ninth or tenth anæsthetic and one often meets men who have had twenty-five or even thirty. Most have been severely wounded, but with the exception of those who have been much burnt, and who stand operation badly, and of those in whom the function of mastication is lost and whose nutrition is therefore poor, the long and repeated operations are borne remarkably well.

The mental condition of the patients is interesting; of the operation itself they have no fear and are even careless after many, but with regard to the anæsthetic there is always a certain amount of distasteful apprehension. In the case of officers this apprehension is considerably more marked; flying officers who have had a crash seem to be particularly nervous, some of them going through their fall again whilst going under.

PREPARATION OF THE PATIENT.

This does not differ from ordinary hospital routine. A notice advising patients to refrain from excesses of any kind for three days before operation is posted in the wards, but receives doubtful attention.

¹ At a meeting of the Section, held February 4, 1921.

PRELIMINARY INJECTION.

Atropine, $\frac{1}{50}$ gr., is administered in all cases. We find that smaller doses are insufficient to control the flow of mucus. As regards morphia—one of us administers $\frac{1}{6}$ gr. unless specially contra-indicated, whilst the other gives $\frac{1}{4}$ gr. in only those cases in which gas and oxygen are to be given.

INDUCTION.

The patients are extremely intolerant of anæsthetics, especially ether; so much so that a little ether accidentally spilled in a ward is quite sufficient to put most of the inmates off their dinner. Many men begin retching immediately they enter the anæsthetic room. We have used tincture of lavender and tincture of bitter orange to mask the smell, putting a little about the room and on the mask, and have frequently found it very effective.

Like all soldiers, our patients are resistant to the action of the anæsthetic drug. It is no uncommon thing to use 6 oz. of ether and to take ten or twelve minutes to get a patient properly under.

Our chief difficulty, however, is always that of maintaining a proper airway. Loss of part of the mandible, scarring and adhesions around the tongue, microstoma, trismus, and splints or other apparatus fixed in the mouth are the chief obstacles to be circumvented.

With ether and mixtures our general practice is to hold up the base of the tongue with a long blunt instrument such as a pair of sponge-holding forceps passed through the mouth immediately any signs of diminished airway appear. Traction on the tongue and advancement of the jaw, when present, are usually of no avail in cases with lower jaw injuries. Nasal tubes are sometimes useful, but do not always give a sufficient airway. In this connexion Dr. Rood's method of induction with ether by gradually drawing a towel over the head and including the mask and anæsthetist's hand is particularly useful, since it allows full control of the airway without interruption of the steady increase of ether concentration. The preference shown by these men, who so detest ether, for an induction at any rate started with gas and oxygen is natural, but it is only lately that we have arrived at a technique which enables us to use it in the case of patients with broken or abnormal jaws. Our procedure is as follows:—

A large size London Hospital or funnel airway is chosen and a 5-in. length of rubber tubing which will just pass through it is pointed and eyeletted at one end. By stretching successive portions along one aspect of the tube a curve may be imparted to it. The airway is inserted between the patient's teeth and a gas mask with an extra large air cushion, such as Marshall's, applied. An air-tight fit is usually easy to obtain. If this is not possible, the valves are set to "to and fro" and sufficient gas and oxygen run into the bag to keep it gently blowing out around the mask. As soon as the patient's airway begins to diminish the mask is quickly removed and the rubber tube, previously greased, is rapidly passed through the funnel airway with its point at first directed towards the palate. It thus runs along the roof of the mouth and its getting caught under the tongue is avoided. When it has entered about 2 in., it is given a half-turn, and pushed home for its entire length. A good airway always results and the tube is passed so quickly that the patient does not have time to recover.

It is worth noting that we have had only one case with a permanent tracheotomy and in no other has a tracheotomy been found necessary to ensure safe anæsthetization.

Few patients show signs of much nervousness, but as an attempt to obtain a happier induction and to abolish struggling we have of late made use of a certain amount of suggestion.

MAINTENANCE OF ANÆSTHESIA.

The methods of maintaining anæsthesia vary according to the requirements of the surgeon and the site of the operation. Roughly speaking, when the site is above a horizontal line drawn through the upper lip the anæsthetist is given control of the mouth for his administration, and the mouth is excluded by towels from the aseptic field. When the site is below this line he is given control of the nose, which is excluded as before.

The following scheme indicates roughly the range of operations performed. It is subdivided into groups upon which the route of administration is dependent:—

GENERAL CLASSIFICATIONS OF OPERATIONS.

Group I.—Mouth available.

- (A) *Eye*.—(1) Reconstruction of eyelids: forehead flaps, &c.
(2) Skin grafts to outer aspect of lids for cure of traumatic ectropion.
(3) Skin grafts to the eye-socket for correction of distortion.
- (B) *Nose*.—(1) Simple plastic procedures.
(2) Preliminary rhinoplastic operations: establishment of airway, &c.
(3) Complete rhinoplasty.
(4) Cartilage grafts from ribs to nose, requiring relaxation.
- (C) *Intra-nasal*.—Some for cure of conditions due to wounds: most for ordinary civil nose and throat complaints.

Group II.—Nose available.

- (A) *Intra-oral*.—(1) Skin grafts to restore sulci, &c.
(2) Various plastic operations inside the mouth, including a few cleft palate operations.
- (B) *Bone-grafts*.—Iliac crest to mandible.

Group III.—Mouth or Nose available according to site.

General plastic operations to face and lips:—

- (1) Simple excision of scars.
- (2) Large flap replacement, e.g., double pedicle forehead flaps for repair of chin region.
- (3) Fat grafts from the abdominal wall.
- (4) Formation and transplantation of tubed pedicles.

GROUP I.—THE ANÆSTHETIC IS ADMINISTERED BY THE MOUTH.

This is the route used in all except intra-oral and lip operations.

(A) The simplest method, and in short cases with normal jaws, the easiest, is the use of a Hewitt's or Phillip's airway with Dr. Shipway's three-bottle warm ether apparatus. The great drawback of this method is the necessity for supporting the chin. The anæsthetist's hand must lie under the towels and any movement on his part is liable to disarrange them. This is avoided by the use of a long wide rubber tube passed well beyond the base of the tongue, or better still by intubation with a Kühn's tube.

(B) An improvement on this method consists in the use of an angle-piece attached to the airway or long pharyngeal tube, and connected by a short length of wide-bore rubber tubing to a funnel, the mouth of which is covered

with flannel or gauze on which the anæsthetic is dropped. The mouth and nose are packed so that respiration takes place entirely through the tube.

The method has the following advantages: (1) Simplicity; (2) the mouth can be closely covered up; (3) the patient's expirations are entirely diverted from the surgeon; (4) the respiratory sounds are magnified at the mouth of the funnel.

The disadvantages of the method are: (1) The use of the apparatus involves the "draw-over" principle. A wide bore tube and the absence of valves, however, actually cause little resistance. We have employed this method many times without untoward results in short operations. (2) The anæsthetic vapour is not warmed. This difficulty can be partially overcome by supplying warm ether vapour from a Shipway's three-bottle apparatus into the funnel.

An example of an attempt to develop this simple apparatus and overcome its disadvantages is exhibited. The tube and funnel attachment of Kühn's tube offers, in our opinion, too much respiratory resistance and is therefore not used.

(C) The same arrangement of Phillip's airway or pharyngeal tube with angle-piece and wide tubing can be attached to a Bath three-way stopcock and gas bag, after removal of the face-piece, and nitrous oxide, oxygen and ether administered with rebreathing. In one or two cases we have passed a stout rubber tube through the glottis by direct vision and connected it with the wide tube and gas bag with satisfactory results.

(D) *Endopharyngeal insufflations* of ether, delivered from an intratracheal apparatus, or of gas-oxygen-ether are both very easy and require no comment beyond the fact that we find it advisable to use a tube of at least 1 cm. calibre and to hold it in place by adhesive plaster. The method is very wasteful of gas.

(E) *Intratracheal insufflation*.—For by far the greater proportion of cases intratracheal insufflation is our method of choice. Its safety and freedom from airway troubles, no matter how much the surgeon may move the patient's head, or in however awkward a position he be, make it invaluable in plastic work.

We have found that in many cases there is some resistance to expiration. A tube, passed down by the side of the catheter almost as far as the glottis, obviates this and allows proper collapse of the chest, thus aiding circulation and avoiding unnecessary strain on the heart. When ether is being given it is a distinct advantage to the surgeon if an angle-piece be attached to this tube and the ether-laden expirations be thus carried a few inches to the side, so that he does not get them full in the face.

The method of intratracheal administration of ether is well known and requires no comment, but intratracheal insufflation of gas-oxygen-ether has given such good results in these long cases that a few remarks concerning it are not out of place. Manifestly, gas with sufficient oxygen for the patient's needs will not keep him properly anæsthetized. A certain amount of ether must therefore be added and, as with intratracheal insufflation there can be no rebreathing into a bag, a definite, small, but perfectly controllable amount of ether vapour must be continuously added to the mixture. This we achieve by means of the bottle to be shown later.

In connexion with the introduction of the catheter in these cases the following points may be emphasized:—

(1) The relaxation of a really deep anæsthesia makes it much easier to view the cords, especially in much scarred cases. With cocaineization and light anæsthesia we find much more difficulty.

(2) To circumvent such obstacles as degrees of trismus, microstoma, and the receding jaw often resulting from bone grafts in the symphyseal region, the use of a small sized laryngoscope is often necessary. Lubrication of the laryngoscope with vaseline helps considerably.

(3) We find it easier to keep the patient's head in a perfectly natural position, neither flexed nor extended; but in cases with much loss of the mandible it is sometimes better if the head be slightly flexed. In these cases the whole larynx has dropped and the distance from the teeth to the cords is greater.

GROUP II.—THE ANÆSTHETIC IS ADMINISTERED BY THE NOSE.

This channel is used in operations upon the mouth and lips. The mouth or pharynx is usually packed with gauze to prevent blood from trickling back or bubbling up and obscuring the surgeon's view.

(A) A nasal airway is obtained by passing a rubber tube through one side of the nose and well beyond the base of the tongue. A tube leading from a Shipway's three-bottle apparatus is now hooked into the end of this nasal airway and held in position by adhesive plaster. This is an unsatisfactory method, a sufficiently free airway for proper to-and-fro breathing being very rarely obtained. Nasal tubes should be shaped to a point and smeared with vaseline to facilitate their passage. It is as well to have at hand one or two sizes varying from about 22 to 32 French catheter gauge. Starting with the smallest they can be passed one after the other, thus gradually dilating the nasal passage and enabling the largest to lie without kinks or constrictions.

(B) The nasal tube may be connected by an angle-piece to a larger tube, which by its other end is attached to a funnel, our funnel apparatus, or a gas bag, in the same way as described for administration by the mouth. In giving gas it is often useful to keep the bag slightly distended so that inspiration is performed with less effort.

At one time we used two nasal tubes connected with the larger tube by a "Y" piece, but the frequent occurrence of the condition of deflected septum and also the fact that the tubes were liable to compress each other forced us to the conclusion that one large tube, passed after gradual dilatation of the nasal passage, gives by far the best airway.

(C) *Endopharyngeal Insufflation* of ether or gas-oxygen-ether proves very useful in cases of trismus, where the mouth cannot be opened sufficiently to admit a laryngoscope, and in cases in which the jaws are splinted up for bone grafts. A medium sized nasal tube, connected with the anæsthetic supply is passed into the pharynx through one naris and, if the operation is likely to cause bleeding into the mouth, a larger sized tube is passed through the opposite side of the nose to provide a return airway and the back of the mouth packed with gauze. Ether vapour or gas supplied to the patient in this way should have a safety valve in its course as in intratracheal insufflation, as any obstruction to the return airway would mean a great increase of pressure in the patient's air passages.

(D) *Intratracheal insufflation by the nasal route* is even more useful than by the oral route. It gives the anæsthetist that happy confidence in freedom of airway and the impossibility of blood getting into the trachea just in those cases where he most needs it. For all intra-oral operations it is combined with a return nasal airway through the other side of the nose. Where the pharynx cannot be conveniently packed the intermittent use of a suction apparatus attached to this return airway is of great advantage in keeping a clear field for the surgeon.

Passing the catheter is not difficult. It consists essentially of three stages: (1) Passing the catheter through the nose and nasopharynx; (2) catching it up in the pharynx by means of a special guiding rod or forceps; (3) directing it into the trachea. The guiding rod is a round rod of metal $10\frac{1}{2}$ in. long. The end for picking up the catheter is sloped away on its under side in order to allow it to dip more easily from the laryngoscope into the eye of the catheter and the terminal quarter-inch is slightly tilted upwards. This tilt gives an upward bend to the catheter which makes its introduction through the cords much easier. When an "aseptic" catheter is used, before it is introduced, the end of the guiding rod is pushed from the top of the eye into the solid end and a little notch made for its reception in stage (2). This is unnecessary when the old type of catheter with hollow end is being used.

Magill's forceps are constructed with a bend to clear the field of vision as in Heath's nasal forceps, the ends which grasp the catheter representing a cylinder split longitudinally and serrated on its inner surface. With their use there is no injury to the end of the catheter and, once grasped, the hold is secure without the necessity of holding on to the free end which protrudes from the nose. The forceps may be used inside as well as at the side of the speculum; with the latter method the field of vision remains clear.

Details of Method.

Stage I.—The passage of the catheter through the nose is usually easy. Stiff, new catheters sometimes strike the back of the nasopharynx and refuse to go on. Rotation of the catheter or the previous passage along its lumen of a piece of stout wire, followed by bending so that there is a very distinct tilt to the end of the catheter will usually overcome this difficulty. The wire should, of course, be removed before proceeding to the next stage.

Stage II.—A view of the catheter is obtained by means of a laryngoscope passed through the mouth. If the guiding rod is used, it is passed down the speculum and its extremity pushed into the notch in the end of the catheter, the outer end being held meanwhile, between the little and ring fingers of the hand manipulating the rod. After it has been picked up it is essential that the catheter be held taut outside the nose so that the guiding rod shall remain pushed home in its end. With the forceps all that is necessary is to seize the catheter near its end.

Stage III.—The laryngoscope is now manipulated so that a view of the glottis is obtained; the end of the catheter is directed between the cords and then pushed on from its nasal end.

In the case of an ordinary adult the catheter should be passed for a distance of about 30 cm. from the ala of the nose, or about 5 cm. farther than the distance from the teeth required in the oral route.

In a few cases it is not necessary to guide the catheter at all; it happens to have the correct curve to carry it through the glottis when it is simply pushed on from the nasal end. This is especially likely to happen when the epiglottis has been raised by the laryngoscope. Definite attempts to judge this curve and so simplify the procedure have not, however, met with much success; moreover, one cannot always ensure that the catheter will lie in the mid-line.

To prevent kinking of the catheter in its course round the ala nasi, it is a good thing to cut off the outer end and fit on a small metal angle-piece.

The return airway is obtained by the passage through the opposite naris of a piece of large sized rubber tubing (30 or 32 French catheter gauge, walls

2 mm. thick), after gradual dilatation, as already described, for obtaining a nasal airway. The length of tubing required may be roughly estimated by the distance between the ala nasi and the external auditory meatus of the same side; but the most suitable length can really only be found by trial in each case, a good return airway with the end of the tube as near the glottis as possible being the aim. A metal angle-piece may be fitted into the outer end of the tube to direct the anæsthetic vapour away from the surgeon and to prevent towels obstructing the airway. The back of the mouth is now packed with a long strip of gauze.

GROUP III.

One or other of the foregoing methods is used according to the chief site of operation.

NITROUS OXIDE ANALGESIA.

Where a patient has to undergo so many operations it is obvious that some alternative to repeated general anæsthesia is desirable.

In operations involving the transposition of flaps the importance of maintaining the vitality of the part is considered by some to render the injection of local anæsthetics inadvisable. For the excision of small scars, however, local infiltration with novocaine and adrenalin proves satisfactory. For more extensive operations we found that local infiltration was insufficient and therefore combined it with an injection of morphia and scopolamine. Even this union left something to be desired in many cases—the patients felt no pain but were often much distressed. We now add to this nitrous oxide analgesia and find the combination gives by far the best results. The patients are cheerful though sleepy; and feel no pain or discomfort, though quite large operations are performed on their faces.

Morphia $\frac{1}{4}$ gr. and scopolamine $\frac{1}{160}$ gr. is administered three quarters of an hour before operation. Arrangements are made for the supply of gas by means of a bent metal tube in the mouth or a short rubber one in the nose. If convenient to the surgeon a nasal cap may be used.

Where the anæsthetist has complete control of the mouth, a rubber mouth-piece, such as was used on the military anti-gas mask, is more comfortable for the patient to hold. We have used this mouth-piece connected with a gas bag, the lips being covered by a piece of rubber sheeting, and in this way have been able readily to vary the degree of analgesia. Where necessary the patient can even be rendered unconscious for a short time. This is particularly useful in the cutting of skin grafts without novocaine infiltration, the removal of extensive nasal polypi and curetting of the ethmoid cells. It is also useful in the operative treatment of squint as one can prevent the patient from feeling any pain and, by withholding gas, allow him to move his eyes when asked to do so by the surgeon.

In all ordinary cases the patient is instructed to take sufficient gas to produce a feeling of "woodenness." Thereafter he regulates the amount of gas inspired so as to keep himself in that condition in which he is still conscious and able to answer questions, though aware of the manipulations of the surgeon, and yet feeling no actual pain.

The operation area is infiltrated with 1 per cent. novocaine and adrenalin 1 in 1,000, three drops to the ounce.

Intelligent co-operation and self-control are essential and the method is not so useful in nervous or emotional patients.

CONDITION OF PATIENT DURING OPERATION.

Although the operations are long (their average duration in our last 500 cases was one hour and forty minutes, and three hours is often exceeded) the condition of the patients is, on the whole, surprisingly good. Shock and collapse are not often seen; when they do occur it is generally in large flap operations, necessarily accompanied by a considerable amount of hæmorrhage, as for example when a double pedicled flap from scalp to forehead is brought down over the face for the reconstruction of the chin region.

When signs of collapse do appear it is generally sufficient to tip the table slightly, but in cases in which much blood has been lost we make a rule of giving saline by the rectum. In large flap operations the patient is often placed in a half-sitting position by the surgeon in order to diminish hæmorrhage: although this certainly does lessen the amount of bleeding, it undoubtedly appears conducive to collapse, and we usually request the surgeon to lower the patient as soon as the flap has been cut and the bleeding points secured.

RECOVERY.

In very many of our cases the injuries about the mouth are such as to render the maintenance of the airway somewhat difficult after return to the wards. It is sometimes sufficient to leave the catheter in the trachea until the patient begins to cough it out; in other cases a long piece of tubing passed down beyond the base of the tongue attains the same object. In this respect the superiority of gas-oxygen-ether over ether alone is evident on account of the very rapid return of reflexes.

It is important that the pharynx be cleared of mucus or blood by careful swabbing before the patient leaves the theatre.

Post-anæsthetic vomiting with gas-oxygen-ether is negligible in amount. The patient usually vomits once, a few minutes after the administration is stopped, and before he is conscious, and then no more. With ether, vomiting usually returns two or three times during the twelve hours after operation. Careful cleansing of the pharynx and mouth of all ether-laden mucus and blood, attained in intratracheal cases by free irrigation with saline, we are certain does much to prevent this post-anæsthetic vomiting.

Chest complaints are rare. Out of 1,700 cases during the last twelve months we have had four cases of bronchitis and two of pneumonia. This may be due to the fact that our ether or gas is always warmed, and that as the operations are not of an urgent nature, they may be postponed if the patient complains of cough or cold.

CONCLUSIONS: CHOICE OF ANÆSTHETIC.

It early became apparent that as the same patients were coming up for operations again and again, it would be a distinct advantage if records of all anæsthetics were kept: a form for this purpose was printed and used.

Of general anæsthetics, the choice lies between ether and gas-oxygen-ether. Chloroform is practically never given. The patients usually do well on ether, but their general condition both during and after operation is decidedly better when gas-oxygen-ether is used. The early return too, of the reflexes and the almost entire absence of vomiting, make it highly preferable for these cases. When the surgical condition permits, it is not uncommon to find patients up and about on the day after a long gas anæsthetic administration.

In a few cases in which there were signs of bronchitis, a mixture con-

sisting of one part chloroform diluted with nine parts of spirit. vini rect., was used with the gas mixture. The course of the anæsthesia went smoothly, and the patient suffered no ill-effects nor was the bronchitis increased.

Rectal oil ether was at one time largely used for these cases, but was abandoned, not only because of the uncertainty of its effects and the tedious preparation required, but because the same difficulties of airway were encountered and had to be overcome, as when the patient was anæsthetized via the respiratory passages.

Of the methods of administration intratracheal insufflation is by far the most valuable, and is used in fully nine out of every ten cases. Its freedom of airway reduces the chances of anæsthetic shock to a minimum, and the lack of respiratory effort is no doubt a material factor in supporting the patient's strength. Its easy control, without in any way disturbing the surgeon, is also a great advantage in these essentially aseptic operations.

For selected cases local anæsthesia combined with gas analgesia is useful, and quite extensive operations are often performed with it. Amongst others we have records of three bone-grafts of the mandible in which this form of anæsthesia was used.

On the whole tissue trauma is small. Although most of the operative manipulation is confined to skin, there is no tearing or pulling, so that few harmful stimuli should reach the brain; moreover, except when taking cartilage from the ribs, the surgeon never requires relaxation. Prolonged deep anæsthesia in itself seems to produce a condition of collapse, so that taking into consideration the protracted nature of most of the operations, we believe that the less anæsthetic given the better is the patient's general condition both during and after operation. We, therefore, after the first incision, keep our patients as lightly under the anæsthetic as is consistent with a smooth and tranquil anæsthesia.

DISCUSSION.

Mr. ERIC GANDY asked whether the authors could give in detail their reasons for abandoning colonic oil ether anæsthesia in these operations on the face where a good airway existed.

Mr. BOYLE said that to produce good anæsthesia for plastic operations on the face at times taxed all the ingenuity of the anæsthetist, for in this type of operation were to be found some of the most difficult cases. He was particularly interested in the description of the passing of the tube through the nose and thence into the larynx; and thought that of the two instruments shown for the purpose of introducing the catheter the forceps was preferable. He was interested, too, in the "dilatation of the nose," so that a large tube could be passed on either side, but did not this tube cause bleeding? His own experience of passing nasal tubes was that although one side of the nose was usually free, it frequently happened that it was almost impossible to pass a second tube through the other nostril. He was not surprised to hear that the oil ether anæsthesia had been discontinued for these cases of plastic operations. During the war he had had a considerable experience of oil ether *per rectum* in this type of work, but had come to the conclusion that it was too uncertain in its action, and frequently had to be supplemented by some other anæsthetic; at first he had used open ether or chloroform, but in the later days of the war he used gas and oxygen. There was also another objection to the oil ether, viz., the long period of unconsciousness after the operation before the drug was eliminated. At the moment he was using for this type of case a combination of gas-oxygen and C.E., and had some excellent results with it. The experience of the writers of this paper coincided with his own, namely, that patients after a prolonged operation under gas-oxygen-ether were far better than when

26 Rowbotham and Magill: *Anæsthetics in Plastic Surgery*

ether alone was given. He had been giving gas and oxygen by the endotracheal method and the results were exceedingly good; he described the case of a man who had glycosuria and to whom he had given gas oxygen endotracheally for over two hours for a rhinoplasty. All sorts of gadgets were necessary in anaesthesia for plastic surgery of the face, and in the contrivance of these the writers of the paper has shown great ingenuity.

MR. KIRKBY THOMAS said he had given a considerable number of anaesthetics to patients suffering from jaw injuries in the special department for these cases at the First Southern General Hospital. His method, after preliminary narcotization with morphia and atropine, was to induce anaesthesia by means of the C.E. mixture on an open mask. A wide rubber tube was then passed well down into the pharynx and packed round with gauze. Free respiration having been established through this tube, the delivery catheter of a Junker's inhaler was passed into the tube and retained in position there by pressure against a safety-pin transfixing the pharyngeal tube. The administration was then continued with a mixture C_4E_1 by means of the Junker. This mode of anaesthetization was found to be particularly successful. The surgeon was eminently satisfied and the after-effects were slight. Mr. Kirkby Thomas emphasized the fact that the degree of anaesthesia required in these cases was very light, and that the excellent results obtained by the method were probably due to that.

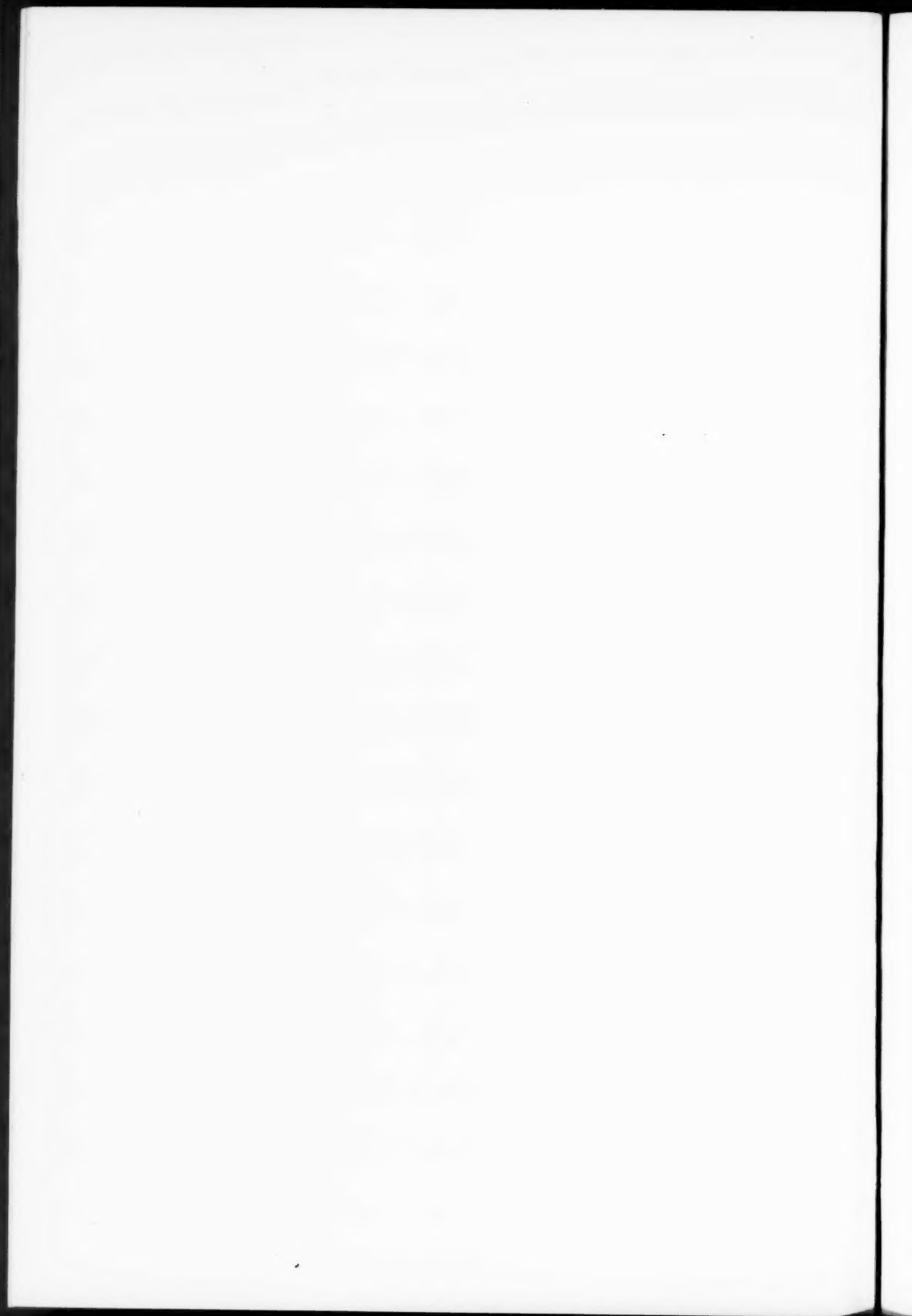
DR. MCCARDIE said that throughout the war period he had given the anaesthetics in the department at the First Southern General Hospital, which dealt with exactly the class of cases treated at Sidecup. Rarely had he used any but the most simple of methods for maintaining anaesthesia: viz., that by nasal or oral intubation and "draw over" inhalation from a mask or plain gauze. He had found this method altogether satisfactory, and so had the surgeon and dental surgeons concerned. In nasal intubation it was important that the tubes should have as large a lumen as possible and be comparatively stiff. Shortened œsophageal or Crile's tubes with lateral and end openings were used, the nasal end opening being as large as the distal. Occasionally one tube was placed in the mouth and the other, or others, in the nose. In oral intubation the anaesthetic was sometimes pumped into the tube after the mouth had been well packed with gauze, but generally the "draw over" method was adopted. Morphia, $\frac{1}{8}$ gr., with atropini, $\frac{1}{160}$ gr., was invariably injected half an hour before operation. For induction of anaesthesia a few drops of E_2C_1 dropped into the bag and followed by $E_{16}C_1$ from Clover's inhaler were, if possible, used; anaesthesia was then continued with chloroform. There were advantages in administering chloroform. There was very little oozing of blood, while respiration and circulation were quiet. Vigorous breathing from etherization, especially through nasal tubes, resulted in a relative obstruction and strain on respiration, followed by secondary strain on the heart in a long operation. But the quiet respiration under chloroform could be efficiently carried on without strain through the tubes or through even one tube and very light anaesthesia easily maintained. He had never seen any ill after-effects due to chloroformization in these cases. With regard to rectal oil-ether anaesthesia it was found that the men objected to it, and, like the intratracheal method, it was unnecessarily involved and time-using in very busy operating theatres as a routine procedure.

DR. F. E. SHIPWAY said that there could be no doubt that intratracheal ether was much superior to the older methods of anaesthesia for operations on the face. He quite agreed with Mr. Boyle that passing tubes through the nares was not without serious disadvantages; it frequently caused damage to the mucous membrane and free bleeding. He had always been opposed to the passing of the intratracheal catheter nasally, for he felt that there was a risk of carrying septic material from the nose or pharynx into the trachea and blowing it into the bronchi. He noticed that Mr. Rowbotham and Mr. Magill had reported two cases of pneumonia in their series. Did either of those cases occur in patients who had been given intratracheal ether through a nasal catheter? He was glad Mr. Rowbotham and Mr. Magill had condemned the use of his warm ether apparatus as a draw-over inhaler. It was never intended to be used in that way, as the lumen of the tubes was much too small and the dead-space was considerable.

Mr. CHARLES T. W. HIRSCH said that the question of nitrous oxide oxygen anæsthesia was one that much appealed to him, though he thought that in a certain number of these cases the assistance of other agents was at times needed. The one in common use was ether, as stated by the authors. Bubbling gas oxygen through chloroform, which produced a light chloroform anæsthesia, was, as Levy pointed out, a source of danger. The objection to bubbling through ether was that it was easy to use more than they wanted to secure results; in addition, the occasional large dose of ether was against the golden rule of uniformity of anæsthesia dosage and anæsthesia. To obviate this, he had fitted a T-piece with three taps to the ether bottle; when the centre tap was open and the two side taps closed gas oxygen passed pure; when the first tap was closed and the others open it bubbled through the ether; but with the central one open and the others also open, the gas in passing drew up a small amount (about 2 per cent. to 3 per cent.) of ether, which ensured the needed uniformity of dose and obviated the excessive occasional larger percentage. By this means, after induction with gas oxygen, the required depth for these cases could be obtained and maintained without justifying the term "a camouflage for ether." He showed the fitting in question at a meeting of the Section in 1918, and an account of it was published in the *Lancet* of July 13, 1918.

Mr. ROWBOTHAM (in reply) said that in passing the catheter through the nose, it did sometimes happen that it could be pushed straight on into the trachea, without any other manipulation being required, but in these cases experience had shown the need for some other more certain means of guiding it. In neither of the two cases of pneumonia reported was a tube passed by the nose. He had never been troubled with much bleeding when passing tubes through the nose. Shaping the tube at its end to a point, smearing it with vaseline, and gradual and gentle dilatation, starting with a very small tube, seemed to be the main points.

Mr. MAGILL (in reply) thought that long operations and repeated anæsthetization were in themselves sufficient factors to warrant the choice of an agent less toxic than chloroform. He was of the opinion that even though hæmorrhage might be greater with ether, it was better that hæmostasis should be carried out at the time of operation than that the surgeon should be called to deal with a reactionary hæmorrhage not apparent at the time of operation, owing to the depressant effect of chloroform on the circulation.



Section of Anæsthetics.

President—Dr. H. J. SHIRLEY, C.M.G.

The Importance of an Examination of Patients by the Anæsthetist previous to Anæsthesia.¹

By RAYMOND E. APPERLY, L.R.C.P., M.R.C.S.

DURING the last fifteen years we have seen many and great improvements in all branches of medicine, and I think we may say that the improvements in our own speciality have been as great as in other departments. The status of the anæsthetist has improved, the teaching of anæsthetics is more thorough, and as a consequence the keen student is interested and often attracted by this branch of medicine. It is of interest that the recent improvements have not been in the increased number of the drugs at our disposal, but in the variety of the more scientific methods which we have at our command for their administration.

This increase in the variety and accuracy of the methods of administration is of the greatest value to the patient and the surgeon, but it places, at the same time, a much greater responsibility on the anæsthetist in his choice of the method which he shall adopt in any given case.

The surgeon of to-day appears fully to realize this. He demands more than simply a condition of anæsthesia which enables him to perform an operation with the greatest facility and comfort, but he rightly expects that his anæsthetist, by his choice of drug and method of administration, shall not only keep the patient safe during the operation, but shall neither jeopardize his recovery nor retard his convalescence. He is not pleased if a patient for whom he has done a gastro-jejunostomy subsequently develops broncho-pneumonia, or a case of acute appendicitis dies a few days after operation from acid intoxication.

We have seen comparatively recently the introduction of spinal analgesia, anæsthesia by intratracheal insufflation, by introduction of oil-ether into the bowel, the more extensive use of nitrous oxide, and the increased use of regional and infiltration anæsthesia, to say nothing of their many useful combinations.

However, in spite of these many and great improvements, post-operative sickness is still with us—though now only in a small proportion of cases; we occasionally see lung complications delaying recovery—though the use of atropine has made them comparatively rare; renal complications and acidosis are sometimes seen, and, according to the Registrar-General's reports, deaths during anæsthesia are not unknown.

We must all, therefore, agree that there is still room for improvement, and I would suggest that without addition to the means already at our disposal, we may considerably better our results by a thorough examination

¹ At a meeting of the Section, held March 4, 1921.

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of our patients some time before operation, and, in the light of the knowledge so gained, carefully select our drugs and the method of their administration.

There are certain factors—I am now speaking more particularly of private practice—which we know without having seen the patient, which influence us in the choice of anæsthetic. We know probably the age and sex of the patient, the nature of the operation, and the surgeon who is performing it. But without seeing the patient first, we have no idea of the condition of the cardiovascular, respiratory or nervous systems, or the efficiency of the kidneys, and an examination of these often gives us unpleasant surprises. All of us, I think, as our experience accumulates, build up for ourselves—perhaps quite unconsciously—certain classes or standards into which we mentally group our patient the first minute we see him. We feel instinctively in one case, that we shall not encounter any great trouble, and in the next that the case will be difficult. These first impressions I believe to be of great value, but they must always be supported by a methodical examination, and if that be undertaken some time previous to operation, it gives the anæsthetist time, if the case be a difficult one, for thinking out the line of action which seems to him best. I know nothing more disconcerting than to arrive at a case, to see the patient for the first time in the operating theatre, and to realize that some other method than the one we had thought of adopting would have been best, but that the necessary apparatus is at home. No one wishes to carry about Mr. Boyle's gas and oxygen apparatus, or an intratracheal apparatus with motor, unnecessarily, but we do not wish to be without them if we feel that the necessities of the case demand their use, and the only satisfactory way of telling what these necessities are, is by the anæsthetist seeing the patient for himself some time previous to operation.

The advantages of a previous examination may usefully be viewed from the point of view of (1) the patient, (2) the anæsthetist, (3) the surgeon.

(1) *To the patient*, a surgical operation, especially if it be his first experience, is an adventure which he naturally anticipates with apprehension, and in many cases the administration of the anæsthetic is what he dreads most. A visit from the anæsthetist beforehand means that he does not meet an absolute stranger at the time of the operation, and the anæsthetist is often able to remove many of his patient's groundless fears. The examination of his chest in itself reassures him, for he feels that nothing is being left to chance, and that every possible care is being taken. It is especially important, I think, in the case of children, as it gives one an opportunity of gaining their confidence, which is very helpful subsequently in procuring a quiet induction. The gratitude of the anxious parents is surprising.

(2) *To the anæsthetist* the advantages gained are all-important. He gets a general impression of the type of patient with whom he is dealing, and has time to examine the heart, lungs and urine, and he is able to judge as to how the contemplated operation will be borne. To learn of previous experiences of an anæsthetic may be helpful, or the fact that morphia has made the patient sick on a previous occasion, may influence the anæsthetist in deciding as to what preliminary hypodermic may be necessary.

During such an examination I have twice come across an aortic aneurysm in patients for whom operations of convenience were to be undertaken, and in three cases of slight recurrent carcinoma of the breast, secondary growths within the chest were revealed.

It is surprising how many medical conditions one does come across—emphysema, bronchitis, chronic or early pulmonary tuberculosis, asthma, valvular disease of the heart, to mention some of the more common. None of these may be perhaps of great significance to the anæsthetist provided he knows of their presence, but they may be possibly fraught with considerable danger if he is unaware of it. I suppose none of us pay too much attention to valvular heart lesions, with the possible exception of aortic regurgitation, provided the patient exhibits no signs of failure of compensation such as œdema of the ankles or pulmonary bases, and does not complain of breathlessness or fainting attacks; but myocardial degenerative changes, which are more difficult of detection, may be an important factor in a serious operation. A knowledge of the blood-pressure in these cases may sometimes be helpful.

An examination of the urine should of course always be undertaken and occasionally one comes across the hitherto unsuspected presence of albumin or sugar.

(3) I have always found that the surgeon very much appreciates any endeavour which the anæsthetist may make in his patient's interest by watching the medical side of the case, as he naturally concentrates his attention on the surgical side. Recently I have found it much more frequently occurs, that the surgeon asks his anæsthetist to see a case with a view to getting his opinion as to whether the patient will stand a certain operation or not, and I cannot help feeling that the anæsthetist's co-operation may often be of help.

One has to bear in mind that the surgeons of to-day do more extensive operations than their predecessors, which involve a longer anæsthetic and often more shock. For instance vaginal hysterectomy for malignant disease of the cervix uteri has been replaced by Wertheim's operation, the operation for carcinoma of the breast is much more extensive than it was, excision of the rectum by the abdomino-perineal method and partial gastrectomy are not uncommon. In such operations the ingenuity of the surgeon and anæsthetist may be taxed to the utmost in combating the effects of shock, hæmorrhage and the anæsthetic, and nothing can be left to chance.

It may be urged that in doubtful cases a physician should be called in, especially if any serious medical complication is present, and if it is a question of arriving at a diagnosis I absolutely agree, and feel happier for his advice; but if, as so often happens, he tells us "the patient will stand an anæsthetic," I must confess to feeling no sense of relief. It is not a question of standing an anæsthetic, but of standing an anæsthetic plus an operation. The physician seldom sees an operation, the anæsthetist is constantly and intently watching the effects of them, and even sees a greater number and variety than the surgeon himself.

I would therefore urge that the anæsthetist's help in arriving at a conclusion in cases in which there is a doubt as to a patient's capacity for standing operation is of the greatest value to the surgeon.

Although one is naturally more exercised about patients who are to undergo a serious operation we cannot afford to neglect the minor cases. In fact, I sometimes think that it is in the minor cases that the patient runs the greatest risk, because we are inclined to look upon them as slight affairs, and our preparation is inadequate. Our anæsthetic danger may, however, be as great in an operation for carbuncle as in a hysterectomy.

It must have been the experience of all of us to have been asked to give a

"whiff of anæsthetic"—a hateful expression—for some very minor operation, and on arrival at the house, to have found that the patient has had no preparation, that there is no nurse nor operating table, and that the anæsthetist is expected to give the anæsthetic through the bars of a high-backed bedstead, in a bad light, and amidst a sea of large soft pillows. The risks under such conditions are great, and in my own experience the nearest approach that I have had to accidents in private practice have been in such cases.

Where the surgical risks are of the slightest, we should surely insist that the anæsthetic dangers should be reduced to a minimum. A preliminary visit from the anæsthetist may remedy this state of affairs, but it is not so easy to make alterations at the time of operation.

The question of course arises as to whether it is practically possible to visit all our patients previous to operation, and I must admit that this is often difficult and takes up much time. In private practice, in cases in which the operation is taking place at a distance, it is as a rule impossible, and one has to rely on the practitioner and surgeon for the data we require, and to defer our examination until just before the time of operation. The same difficulty necessarily arises in emergency cases, though the urgency is seldom so great as to prevent the anæsthetist, provided he arrives early, from having time to investigate the case for himself, and from ordering the hypodermic he thinks fit. Such an examination has on three occasions in my own experience revealed an early pneumonia, and on one occasion an acute pericarditis, in cases in which the symptoms were entirely referred to the abdomen. The great majority, however, of our patients are in nursing homes in the immediate neighbourhood, and therefore there is no difficulty in seeing them on the day previous to operation.

In hospital practice the difficulties are greater, owing to the larger number of cases, and the short interval between the patients' admission and the time of operation. It may be of interest to detail the methods that have been adopted at the Middlesex Hospital. Every patient is examined by the house surgeon in charge, and any abnormality in the heart, lungs or urine is noted on the case paper; he also notes the nature and quantity of the preliminary hypodermic which he has ordered, and the time at which it is given. The case paper is brought to the anæsthetic room with the patient, who is then again examined by the anæsthetist. If the house surgeon is in doubt about any case he communicates with the corresponding anæsthetist. I have found it myself most convenient at the end of one hospital afternoon to see the patients who are down for operation on the day of my next visit.

One class of patient, of which it is my misfortune to see a large number, has done more than anything else to emphasize the importance of a preliminary examination. It is the type of case represented by such as are admitted to the cancer department of the Middlesex Hospital, though they are by no means confined to hospital practice. A more undesirable type of patient from the anæsthetist's point of view it would be hard to imagine, especially those from the male wards. The great majority of those who come to the operating theatre have very extensive or recurrent growths for which some palliative procedure is being undertaken, such as the insertion of radium, the extraction of teeth which are cutting a carcinomatous tongue, colostomy, or the application of the cautery. They are cachetic, debilitated, with myocardial degeneration, and some have been bed-ridden for many weeks. These patients present so many complications, such as bronchitis, very marked arterio-sclerosis, secondary growths in mediastinum or pleura, obstruction of the air passages,

that it makes us extremely cautious in our examination before anæsthetizing them. It is even sometimes difficult to decide whether the relief they will derive from the operation is commensurate with the risk they run from the administration of a general anæsthetic. Whenever possible a local anæsthetic is used, but in many cases unfortunately this is impossible. Two points should constantly be kept in mind in these cases of long standing or recurrent cancer. First, that the heart is capable of standing very little extra strain, and secondly, that we should beware of patients who have developed a hard cough without expectoration; this cough not infrequently means growth in mediastinum or pleura.

The two following cases, both of which I have seen since commencing to write this paper, will serve to illustrate the above statement: (1) A woman, aged 36, had her right breast removed in December, 1919, for cancer. She was admitted six weeks ago to hospital, for the removal of a small recurrent nodule in the skin. When I saw her she told me that she had developed a slight cough during the previous fortnight, but had no expectoration. The heart's apex was slightly displaced outwards, and the right side of the chest was dull on percussion almost to the clavicle; no breath sounds could be heard over the lower part of the right chest. Aspiration produced a considerable amount of blood-stained fluid. Needless to say the operation was not performed. The patient rapidly became worse and died within the month. She had secondary growths in the pleura, mediastinum, and diaphragm.

(2) A man, aged 63, who had had a tumour removed from the right foot a year ago, was admitted to hospital with a mass of malignant glands in the right groin. A large dose of radium was to be inserted. Although appearing fairly robust, he complained of a hard dry cough which had developed recently, and of shortness of breath with pain in the left side of the chest. There were a few moist sounds and pleural friction to be heard at the left base. The idea of a general anæsthetic was abandoned, and novocaine was used locally. The pulmonary signs rapidly increased; they were accompanied by respiratory difficulty and the patient went downhill rapidly. He died on March 4, and the autopsy revealed growths in left pleura and lungs.

I have mentioned this class of patient particularly, because of the number of complications they present, and of the great difficulty, and often dangers, inseparable from their anæsthetization; they therefore well illustrate the importance of a preliminary examination.

There is one other point I would like to mention. Last session during the discussion on Mrs. Berry's interesting paper, read before this Section, on "Anæsthetics in Operations upon the Thyroid," Mr. Berry and Dr. Strickland Goodall pointed out the importance of the use of the electrocardiograph in diagnosing the condition of the heart muscle, particularly in cases of exophthalmic goitre.¹ If they have found it of such value in these cases, I would suggest that it might also be of very great value in many of those borderland cases in which it is difficult to tell whether the patient will stand a serious operation or no. No doubt it would take time to build up a standard for each type of case such as they have done in thyroid cases, but I see no reason why this should not be done, and if done, I cannot help thinking it would help very materially in certain cases, as a part of the preliminary examination.

In conclusion, I draw attention to what I believe is a further advantage to

¹ *Proceedings*, 1920, xiii (Sect. Anæsth.), pp. 54, 56.

be gained by a preliminary examination. One has often heard it said that the anaesthetist's job is a monotonous and uninteresting one. I firmly believe that whether it is interesting or the reverse depends very largely on what each one of us makes of it. If we have made ourselves conversant with modern methods of administration, carefully examine our patients before operation, and in the light of the knowledge so gained apply them aptly, we shall find our results greatly improved, and our department of the profession second to none in interest, and variety.

Explosion of Ether Vapour during Laryngoscopy.

By W. J. MCCARDIE, M.B.

LAST month I gave an anaesthetic to a private patient of Mr. Musgrave Woodman for laryngoscopy and removal of a small piece of the vocal cord for examination purposes. The patient was a man aged about 56, short, stout, pale, rather flabby looking, whose neck was thick and stiff. Teeth good and lower jaw undershot. His heart sounds were rather weak and distant; his voice was hoarse but he denied having any cough. $\frac{1}{8}$ gr. of atropin was injected beforehand. Deep anaesthesia was induced slowly with ether by the open method, the patient being rather blue and not breathing freely for a time. It was not easy to get full relaxation. For some minutes before the laryngoscope was introduced I administered ether with oxygen through a nasal catheter by Shipway's apparatus, while continuing ether also by the open method. When the mouth was opened, ether and oxygen being still administered through the nasal tube, Mr. Woodman began to introduce Hill's electric laryngoscope into the mouth. It had not entered more than an inch or so when there occurred two or three very loud reports like small pistol shots, very startling, and flames issued from the patient's mouth; in fact his mouth was on fire. The flames were 5 or 6 in. high and very like those which occur when a Winchester quart bottle of ether is set on fire. As soon as I realized the position I pulled out the nasal tube and the flames instantaneously ceased. The patient went on breathing, his pupils remained small and his condition good. On looking into his mouth and pharynx there was no obvious burning of the mucous membrane, but merely acute reddening. Anaesthesia was then continued with chloroform and oxygen without further trouble. When back in bed the patient recovered normally and had no after cough.

CONDITIONS.

The operating room was large and nicely warmed (temperature 65° F.) by a coal fire about 12 ft. away. At the time of the explosion the room was lit by two $\frac{1}{2}$ -watt bulbs and one osram bulb under a shade 2½ ft. almost directly above the patient's mouth. The tube leading from the ether bottle to the thermos bottle was blown off its attachment at one end. The bulb of the laryngoscope light did not fuse, the light appeared in order, and there was no evidence of short circuiting. Of course, no appreciable heat is emitted by so small a bulb; at any rate no heat that can be felt by the hand when it is first switched on. The danger to the patient and to the face of the surgeon, which is so close to the place of explosion, is obvious. Had the explosion taken place when the electric bulb of the laryngoscope had been introduced to the larynx

or trachea, that is, in a more confined space than the mouth, great damage would probably have resulted to the patient's air-passages and possibly his lungs might have been set on fire. It also is just conceivable that the fire might have spread along the nasal tube to the ether bottle and so caused a big explosion.

With regard to the cause of the explosion, the warm room, warm mouth, warm electric light, warm ether and oxygen vapour would all help. Ether vapour will take fire at a considerable distance from the source of heat. Dr. Squibb (Turnbull, "Artificial Anæsthesia") has seen ether take fire at a measured distance of 15 ft. between the source of escaping vapour and the source of fire. Probably the addition of oxygen to the ether vapour would render it more likely to ignite. Considering the absolute coincidence of the explosion with the introduction of the laryngoscope to the entry of the mouth I think the cause is to be found in the electric bulb of the laryngoscope.

In looking up literature of the subject I find little mention of the danger of explosion of ether vapour in the presence of electric light. Gwathmey says ("Anæsthesia," 1914, p. 179):—

"Where ether is used with electric lights care should be taken that these are not are lights, and if they are incandescent bulbs that there are no short circuits or sparks, as the vapour may be thus ignited."

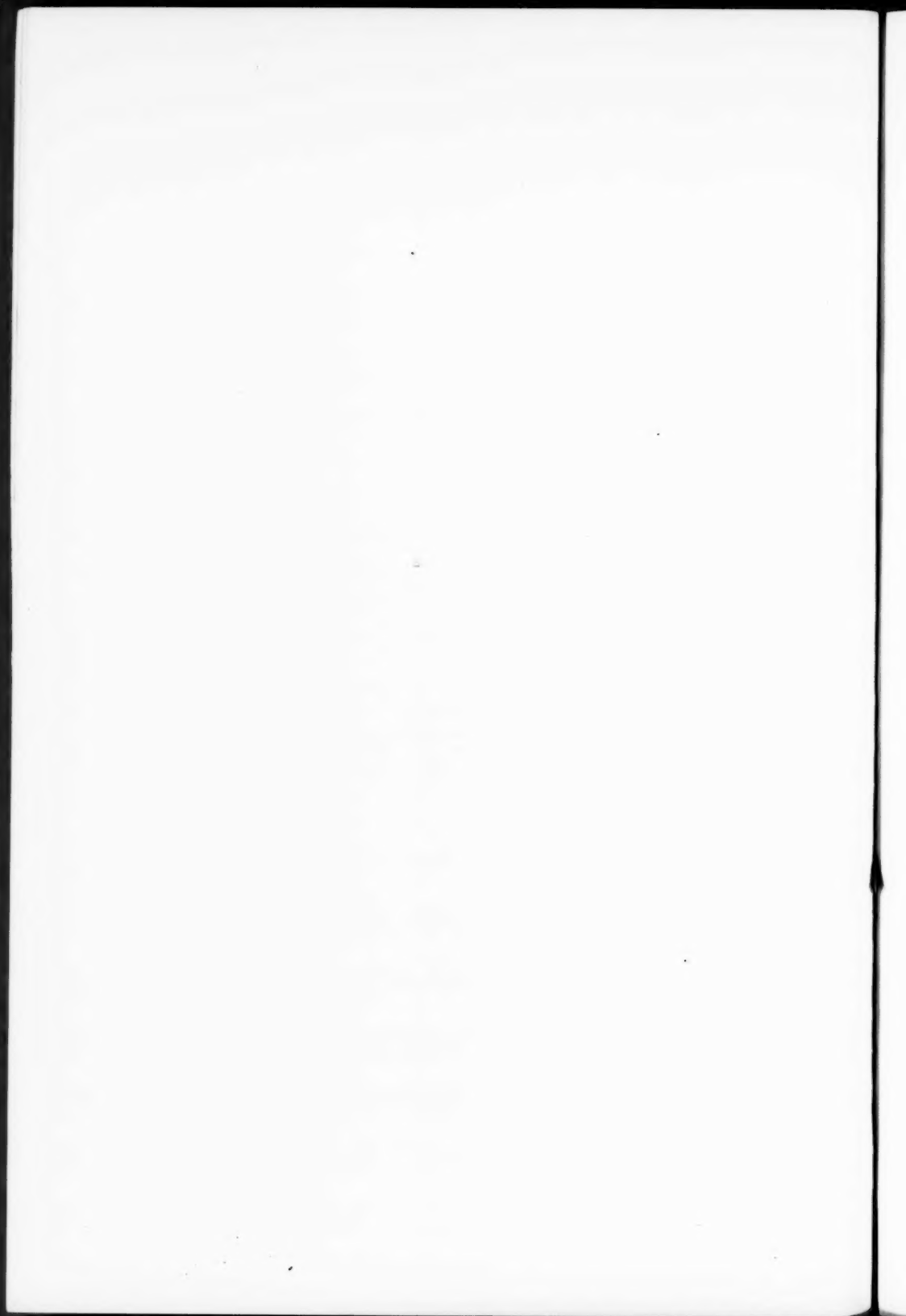
The only case in which I find mention of the ignition of ether vapour in the presence of a closed electric light is in an article by Dr. Dwight H. Murray of New York, (*New York Medical Journal* and *Philadelphia Medical Journal*, June 27, 1903) which is nearly fully reported in the *Lancet* of July 25, 1903, p. 277. As the *Lancet* remarks:—

"An anæsthetist, considering that his electric light is contained in a sealed glass bulb, might be excused for overlooking the possibility of a spark being formed outside the latter when contact is made for the purpose of turning on the light."

The recorder's account is, briefly, as follows:—

While engaged in a tedious and difficult operation in hospital, his attention was taken from his work by a sudden flash of light and quick movements on the part of the anæsthetist, and he found that the ether vapour had ignited, scorching the hair and eyebrows of the patient, and burning the skin of his forehead slightly. The anæsthetist said that as the patient was on his face he could not properly see the pupil, and he had therefore turned on the electric light. The blaze occurred coincidently with the turning on of the light. There was no exposed fire or blaze in any part of the operating-room, and the only conclusion drawn was that the ether vapour had ignited from the spark of the electric light burner made when contact took place in the turning on of the light. Dr. Murray had never seen reported or heard of any such accident taking place during the administration of ether, but the fact that it did occur showed that it could, and might do so again. He had since tried the experiment several different times in different ways, with the same burner and others, and had been unable to produce a blaze with ether vapour.

The moral of my experience is to change over for a minute to chloroform by the nasal tube, or to allow the patient to have a few breaths of air before the laryngoscope is introduced.



Section of Anæsthetics.

President—Dr. H. J. SHIRLEY, C.M.G.

A New General Anæsthetic: Its Theory and Practice.¹

By R. L. MACKENZIE WALLIS, M.D., and C. LANGTON HEWER,
M.B., B.S.

PART I.—BY R. L. MACKENZIE WALLIS.

THE observations recorded in this paper have been obtained by us with the use of a new anæsthetic compound. The theory and chemical details have been worked out by myself, and the application of this compound as an anæsthetic by Dr. Langton Hewer. The details of manufacture will be described in the first part of the paper, and the results obtained upon a large number of patients in the second part. The discovery of a compound possessing powerful anæsthetic properties, which has no relation chemically to either chloroform or ether, is the result of many years of work upon the subject.

Such chemical compounds as ether and chloroform were known for many years before they were applied as agents for producing general anæsthesia. The history of anæsthesia and anæsthetics is of comparatively recent origin, and it is not surprising therefore to find many gaps in our knowledge. A vast amount of work is necessary before this difficult and complex subject is elucidated; and we are at present merely working on the borderland.

THE USE OF ETHER AS A VEHICLE.

For many years I have been engaged upon the problem of the purification of ether; and during my service in India had unusual opportunities of pursuing this subject. The knowledge so gained has since been extended. With pure ethyl alcohol and pure sulphuric acid it is possible, under certain conditions, to prepare ether free from alcohol and water. This ether, when fractionally distilled, yields about 50 per cent. of distillate at a temperature of $34.5^{\circ}\text{C}.$, and practically the whole of the remainder comes over between $34.7^{\circ}\text{C}.$ and $34.8^{\circ}\text{C}.$ There is only a very small residue left. Pure ether obtained in this way, when freshly prepared, can be given in large quantities to animals without producing anæsthesia, in fact the preparation exerts an intoxicating action; moreover, even were this pure product of use for producing anæsthesia, its cost would be prohibitive. Having established this point it became obvious that the anæsthetic properties were wholly due to one or other of the compounds contained in ordinary anæsthetic ether. In view of its volatility, and

¹ At a meeting of the Section, held April 1, 1921.

moderate toxicity, pure ether was evidently the best vehicle that could be used for the preparation of an anæsthetic. Attempts were therefore made to purify ordinary ether for this purpose. The problem was somewhat complicated by the fact that during the war ethyl alcohol became very costly, and available only in limited quantities. The only other source was "industrial spirit," consisting of a mixture of ethyl and methyl alcohols; and this became the sole source for the preparation of anæsthetic ethers. It appears now to have superseded ether made from rectified spirit; and from the point of view of cost alone its use is to be recommended.

IMPURITIES CONTAINED IN ETHER.

Many samples of ether prepared in this way were found to contain not only the three ethers—viz., dimethyl, diethyl, and methyl-ethyl ethers, but, in addition, abundant impurities. There is no doubt that whereas pure ethyl ether undergoes oxidation on standing, it does not do so as readily as the methylated ether. There are, therefore, much larger amounts of impurities in the latter ethers. The chief preformed impurities are alcohol, water, acetone, and mercaptans and thio-ethers. Those formed by oxidation of the ether comprise aldehydes, peroxides, and acids. Carefully prepared samples of ether naturally contain very small quantities of these impurities, but the purer the sample, the more of it is required to produce anæsthesia. It follows, therefore, that if larger quantities are used, the actual amount of impurities administered may be considerable.

REMOVAL OF MERCAPTANS.

The methods usually adopted for purifying ether were systematically investigated, and it was found that most of the impurities were thereby removed. The removal of the chief impurity—viz., mercaptans, proved to be a much more difficult problem. A procedure was ultimately found whereby the mercaptans are completely removed from the ether, and this appears to be the most important part of the process. By distilling ether with very finely divided permanganate it was found that oxidation of the impurities occurred, and if a special reflux condenser was adopted all the mercaptans were retained in the residue. Quantities of ether were treated in this way, and the residues collected. The residue was found to possess an evil odour, and to be extremely poisonous. A mere whiff from the bottle is sufficient to produce a feeling of nausea, and considerable irritation of the nasopharynx. Inhaling even small quantities of the residue rapidly induces a severe headache. The permanganate in a finely divided form absorbs this most potent impurity, and thus removes it from the ether. This is evident if one separates the permanganate after distillation, and subjects it to a stream of dry air. The permanganate gives off the mercaptans completely, and may be used over and over again. Iodine also destroys mercaptans, but its use in place of permanganate is inadvisable for many reasons, chief among them being the difficulty of removing traces of iodine which distil over with the ether.

A PURE ETHER FINALLY OBTAINED.

The ether so treated is quite free from aldehydes and mercaptans, and contains only traces of alcohol, water, and peroxides. To remove these remaining impurities the distilled product is treated with anhydrous copper sulphate. At first I redistilled over the copper sulphate, but

ultimately this was found to be unnecessary, mere shaking and standing being quite sufficient. By this process a remarkably pure ether is obtained, which keeps well, and only slowly undergoes oxidation. The ether prepared in this way has been used as a vehicle for the anæsthetic compound.

IMPORTANCE OF RECOGNIZING CERTAIN IMPURITIES IN ANÆSTHETIC ETHER.

The occurrence of impurities in ether can be best studied in such a climate as India, where ether, especially methylated ether, rapidly undergoes change. One batch of ether I tested was so impure that the evaporation of a small quantity in the laboratory was sufficient to make the place untenable. Salivation, lacrymation, and a severe headache followed the inhalation of fumes derived from evaporation of a few cubic centimetres of the sample labelled "anæsthetic ether." The peculiar odour attracted my attention, and inquiry revealed the presence of quantities of methyl and ethyl mercaptan in these samples. These compounds, in my opinion, were responsible for the unpleasant effects produced. My colleague, Dr. Langton Hewer, came up one day in April, 1920, with the residue of a bottle of anæsthetic ether which he had used on two patients, both of whom had stopped breathing soon after administration of the ether. I at once detected the same odour, and found that the chief impurity in this ether was the mercaptans. Many samples of ether were therefore tested, and the great bulk of them showed this impurity in varying quantities. It appeared obvious that such compounds with their irritating properties were of no use, and that it was highly desirable that they should be removed. Their removal was found to be effected by the use of permanganate as described above. The other impurities were easily removed, but in so doing I removed some compound or compounds which were of importance, since the highly purified product was no longer capable of producing anæsthesia.

At this juncture my attention was called to the production of an ether in America by Dr. J. H. Cotton, who used carbon dioxide and ethylene dissolved in ether. In experimenting with the use of carbon dioxide and ethylene I was struck by the differences in the amount of these gases absorbed by various samples of ether. Absolutely pure ether apparently takes up very little carbon dioxide and ethylene. The ether prepared by the process described above was found to behave quite differently. Using good samples of anæsthetic ether it was found that whereas before distillation practically no gases were absorbed, after distillation with permanganate and copper sulphate comparatively large quantities could be absorbed by the ether. This preparation was found to be extremely potent as an anæsthetic, as I had good reason to realize from personal experience.

PROPERTIES OF THE PURE ETHER.

The pure ether was practically non-irritating, but possessed a pleasant odour and a rather stimulating effect. It was free from aldehydes, peroxides, acids, and water. When treated with carbon dioxide and ethylene its sweet pleasant odour was intensified. This preparation was made, and after being tried upon animals with success by my colleague, Dr. Philip Hamill, it was resolved to try it on human beings. Dr. Langton Hewer set to work and gave this anæsthetic to about 100 cases. All the material was prepared by myself in the laboratory with the standard process which had been evolved. I leave

it to him to describe the results he has obtained. In the meantime the peculiar properties of this anæsthetic were further investigated. Ethylene prepared from ethyl alcohol and sulphuric acid possesses a very pleasant odour, but very little anæsthetic power. When prepared by means of phosphoric acid this pleasant odour is not so obvious, and the ethylene so prepared has a much reduced action when dissolved in ether. It was obvious that the carbon dioxide played little, if any, part in producing anæsthesia, since ether and carbon dioxide alone were found to be without action. It, however, exerts a stabilizing effect, as pure ether, treated with dry carbon dioxide, does not undergo oxidation as readily as pure ether alone.

THE KETONES AS ANÆSTHETIC AGENTS.

The outcome of these investigations was to show that certain ketones in the ether were largely responsible for the anæsthetic properties of the ether. Good anæsthetic ethers, free from aldehydes, mercaptans, &c., when treated with finely divided permanganate, yielded a pleasant-smelling residue instead of the evil-smelling residues previously obtained. This residue proved to contain ketones, and these compounds appeared to be the essential element in the production of a good and safe anæsthetic. The mixture of ketones proved to be very potent, and it was necessary to use a volatile solvent. In view of the readiness with which ordinary ether can be purified, this compound was selected as the solvent. Into this pure ether the mixed ketones were placed in varying proportions, and the mixtures so obtained were found to be capable of producing anæsthesia.

The anæsthetic action was enhanced if the mixed ketones were first treated with carbon dioxide and ethylene. The ketones used comprise those in the middle of the series, and a loose chemical combination between these substances and the carbon dioxide and ethylene apparently results. In attempting to purify ether, therefore, the discovery was made of the importance of certain impurities—viz., the ketones. This opens up a wide field for future investigation, and much further work is necessary before it can be said that the ideal general anæsthetic has been obtained. All the material necessary for the application of this mixture as an anæsthetic was made in the laboratory, and supplied as required to my colleague, Dr. Langton Hewer. As soon as its value as an anæsthetic was established, and requests made for trial purposes by other anæsthetists, it became necessary to place its manufacture in other hands. The preparation of this anæsthetic, according to the method described above, has been undertaken by Messrs. Savory and Moore, who have now placed it on the market under the name of "ethanesal."

PART II.—BY C. LANGTON HEWER.

The theory and chemistry of this new anæsthetic have been explained by Dr. Mackenzie Wallis, and I now propose to bring before you the results obtained up to date. I have endeavoured to obtain reliable records of each case I have anæsthetized, including the induction, anæsthesia, recovery and after-effects. The records of the two latter have been supplied by the Sisters of the Wards, and I have always endeavoured personally to see the patients afterwards. In this way I have tried to form an unbiased opinion of the anæsthetic compared with those in common use, chloroform, ether, and gas and oxygen.

I will first of all describe the observed effects of this anæsthetic (ethanesal) on the various metabolic processes.

(1) *Respiratory System*.—The respiration-rate rises slightly during the induction but not to such a great extent as with ether. When fully anæsthetized the patient's respirations are usually quieter than with ether and more closely resemble those of chloroform anæsthesia.

The irritation to the mucous membrane of the respiratory passages is much less than with ether, as is shown by the ability suddenly to increase the strength of the vapour without causing coughing or spasm.

The salivation is considerably less than with ether, and if atropine has been previously given, it is usually almost non-existent.

In 200 cases I have only had one with post-operative bronchitis, and this occurred in a myxœdematous girl who had to be conveyed for about 100 yards in the open air from the theatre. The temperature outside was below freezing point at the time. On the other hand the anæsthetic has been given to ten patients with well marked bronchitis, as shown by dyspnoea, cough, sputum and sibili in the chest. None of these cases showed any aggravation of the symptoms, and two of the number appeared to be actually better after operation.

(2) *Cardiovascular System*.—The effects of this anæsthetic on the blood-pressure and pulse-rate are shown on the graphs reproduced in the *Lancet*.¹ These were obtained by calculating the averages of a number of cases whose operations were of approximately the same severity. The actual pressures could obviously not be given as the normal, for each individual varies between wide limits. Consequently the normal has been taken as that of the patient before operation. This is probably slightly too high owing to the psychical effect of anticipation, but the error may be neglected as it occurs in all the curves. As the length of time of the operations varied, there is an interval of more than five minutes between the twenty-five minutes' time and the end of the operation. Otherwise I think the graphs explain themselves.

It will be seen that as regards systolic blood-pressure the anæsthetic occupies a position between chloroform and ether.

It is specially noticeable that the drop in pressure at the end of the operation, and before the patient is conscious, is less than with ether.

I think that the fairest comparison between the three anæsthetics is afforded by the pulse-pressure curves, that is, the difference between the systolic and diastolic pressures. It now appears to be generally agreed upon by most authorities that this figure affords a fairly reliable guide as to the condition of the patient, and it will be seen that although it does not rise so high as with ether yet it is the highest of the three at the end of the operation, and afterwards when the patient is conscious.

As regards the action of the anæsthetic on the diseased heart, I have given it in several cases of mitral regurgitation, congenital pulmonary stenosis, and in one case of advanced mitral stenosis with auricular fibrillation, with no ill effects. I have described this latter case in greater detail below.

The anæsthetic has also been given to patients suffering from marked anæmia from hæmorrhage or other causes. The lowest red blood count was in a man with lymphadenoma who had 2,100,000 red cells.

(3) *Cerebral Processes*.—The three stages of anæsthesia as described with ether are observed with this anæsthetic, but can be made to follow

¹ See *Lancet*, June 4, 1921, p. 1176.

one another with greater rapidity owing to the possibility of employing stronger vapour.

The excitement stage is usually not so marked as with ether, and if given with gas and oxygen may be entirely absent.

It is sometimes possible to procure perfect analgesia without anæsthesia, and if a long extra-abdominal operation is being performed, such as an extensive tendon transplantation, the patient can usually be allowed to become exceedingly light, and may even be blinking his eyes, but will remain quite motionless, breathing quietly and not feeling pain.

(4) *Sugar Metabolism*.—No case of post-anæsthetic acidosis has yet been observed with this anæsthetic. Three patients with well-established diabetes mellitus have been anæsthetized and no ill-effects were noticed. Unfortunately the sugar tolerance of these patients was not accurately estimated beforehand, but there was no appreciable diminution observed afterwards. One child who was passing large quantities of acetone in the urine was given this anæsthetic for half-an-hour with no ill-effects.

(5) *Effect of the Anæsthetic on Patients with Various Toxæmias*.—Patients acutely ill with various conditions have been anæsthetized. These include neglected perforated gastric and duodenal ulcers, neglected intussusception, toxæmias of pregnancy, &c. Although two of these patients subsequently died of peritonitis no ill-effects from the anæsthetic were observed, but on the other hand the condition of the patients nearly always improved temporarily when under the anæsthetic.

(6) *After-effects*: (a) *Vomiting*.—Forty-eight per cent. of the patients had no vomiting whatever; 42·6 per cent. retched or vomited once before coming round, but did not remember it, and had no vomiting afterwards; 7·3 per cent. vomited up to one hour after coming round; 2 per cent. vomited for over one hour after coming round. No case has had prolonged vomiting extending over one day with the exception of one of thyroidectomy which developed acute hyperthyroidism after operation.

There is no doubt that there is a large mental factor involved in vomiting, and some patients will vomit even after a simple nitrous oxide anæsthesia. Further, in a children's hospital where this new anæsthetic was given it was found to be quite exceptional for a child to vomit after it was conscious, except in the case of prolonged excision of cervical gland operations where the vagus was disturbed. The Sisters of the surgical wards unanimously agreed that the children were on the average much fitter after this anæsthetic than after chloroform or ether which had previously been used, and that the vomiting was very much less.

(b) *Respiratory Complications*.—None have occurred with the exception of the one case mentioned above.

(c) *Taste and Smell of Anæsthetic*.—These are practically non-existent, and constitute one of the main advantages of the anæsthetic. Patients who have been previously anæsthetized with ether, and have objected to these after-effects have invariably experienced surprise at their absence with this anæsthetic.

I have quite lately anæsthetized a doctor, a hospital nurse, and an army officer, who had all previously had ether and complained of continual vomiting (in one case up to a week) and also of the unpleasant taste and smell. All three patients stated that there was no taste or smell on coming round, and none vomited after regaining consciousness.

No other complications attributable to the anæsthetic have been observed.

METHOD OF ADMINISTRATION.

I have employed four main methods of administering this anæsthetic:—

(1) *Induction by a Clover's Inhaler followed by an Open Mask.*—This method is suitable for most adult cases. Nitrous oxide gas may be used in the induction, but is almost unnecessary as the vapour of the anæsthetic is not unpleasant to the patient. I have usually changed over to the open method just after the skin incision has been made.

(2) *Open Ethyl Chloride Induction followed by the Anæsthetic on an Open Mask with twenty layers of Gauze.*—This method is suitable for children up to 13 years old. I first of all put a few drops of tincture of orange on the inside of the gauze mask. When the child has got used to the smell I gradually spray on the ethyl chloride. Directly he is unconscious I change over to this anæsthetic and pour it on quite rapidly. This can be done without any coughing or salivation such as occurs with ether. When completely anæsthetized it will be found that less anæsthetic is usually required than with ether. The time of induction by this method is short, the average being four minutes, until the patient is ready for an incision.

(3) *Combined with Nitrous Oxide and Oxygen.*—I have usually given this in a Boyle's machine with the following modifications:—

(a) The two-way tap on the ether bottle is replaced by a special tap recently described by Mr. H. E. G. Boyle, which allows any percentage of the gases to pass through or over the liquid.

(b) The bottle containing the anæsthetic is kept standing in a receptacle of warm water in order to prevent freezing taking place.

Very good relaxation can be obtained with this method and such operations as cholecystectomy, ileo-sigmoidostomy, and partial colectomy have been done with it. The time of recovery is usually very rapid, and for this reason the anæsthetic should be continued until the last suture has been inserted and tied.

(4) *Intratracheal Insufflation.*—I have employed this method for the following classes of operations:—

(a) Extensive thoracotomies when both pleural cavities may be opened simultaneously.

(b) Operations on the upper abdomen such as cholecystectomy or gastro-enterostomies in which it is desirable to limit the respiratory movements as much as possible.

(c) In operations on the neck, where respiratory obstruction is anticipated, such as thyroidectomies, where there is a retrosternal lobe.

(d) In plastic operations of the face.

I started by using the anæsthetic in the usual way instead of ether, by blowing pure air over it, but I found that better results were obtained by using it with gas and oxygen.

I have connected the exit pipe of a Boyle's machine to the intratracheal apparatus, and have found that much less anæsthetic is required, and that with this method the patients appeared to be in better condition afterwards.

For all these methods the patients were given an atropine injection. Morphia was not given unless the patient was very excitable or nervous, as in my opinion it tends to mask the useful signs such as eye reflexes, and is best given just before the patient regains consciousness, as he will then remain analgesic for a longer period.

In other respects the patients were prepared as for an ordinary general anæsthetic, with the exception of acute emergency cases which, of course, received no preparation.

ANALYSIS OF RESULTS.

About 250 cases have been anæsthetized so far,¹ and I have detailed reports on the first 200. These were nearly all hospital patients, the majority being at St. Bartholomew's Hospital and the Queen's Hospital, Bethnal Green.

I have divided the quality of anæsthesia into three groups:—

(A) Anæsthesia very good with no salivation, straining or any other difficulties whatever. These constitute 91·3 per cent.

(B) Anæsthesia satisfactory, but slight difficulty such as some rigidity or salivation. These cases were 8 per cent.

(C) Anæsthesia poor or great difficulty experienced. Only one case comes into this class, that of a child with myxœdema.

In no case has a change had to be made to another anæsthetic.

In cases in which the open method has been used the time elapsing between the end of administration and consciousness being regained is on the average about two-thirds of the length of time during which the patient was anæsthetized. If given with gas and oxygen the time is about one-third. The average time of induction for all cases was 4·1 minutes.

The age of the patients varied between 8 hours and 70 years, and the time of operation between five minutes and two hours forty-five minutes.

The first hundred cases were selected to give as representative a series of operations as possible. The remainder were not selected, being just routine hospital cases.

The after-effects have already been described.

The operations performed under this anæsthetic include: Amputation through thigh (four cases), appendicectomy (twenty-one cases), appendicostomy, arthrodesis, astragalectomy, bone plating, cholecystectomy (three cases), cholecystotomy, colectomy (partial), colostomy, cystoscopy, colopexy, excision of glands, excision of hæmorrhoids, exploration of knee-joint, exploratory laparotomy, gastrectomy, gastro-enterostomy, Halsted's operation on the breast, ileo-sigmoidostomy, nephro-lithotomy, œsophagectomy (partial), osteotomy, radical operation for inguinal, femoral, and umbilical hernia (twenty-four cases), reduction of intussusception, sequestrotomy, skin graft, sigmoidoscopy, submucous resection of nasal septum, suprapubic cystotomy, suture of perforated gastric ulcer, tarsectomy, tendon transplantation, thoracotomy, thyroidectomy (eight cases), thyroid graft, excision of thyro-glossal cyst, tonsillectomy, wiring of fractured patella.

None of the above cases gave rise to any anxiety during anæsthesia with the exception of a long gastrectomy on a woman in very poor condition. At the end of two hours she became collapsed from loss of blood, but a blood transfusion was performed, and she greatly improved. This patient made an uninterrupted recovery.

For the long abdominal cases in this list, I have always adopted the method of getting the patients deeply under at the start, and then when the abdomen is opened and the anastomosis or other manipulations are being performed, of allowing them to become quite light, again giving more anæsthetic when the abdomen is being closed. The patients are in better condition at the end of operation, and much less anæsthetic is used than if a uniform depth of anæsthesia is maintained throughout.

¹ At the time of going to press this number has increased to 500.

I will now describe some typical cases in greater detail:—

Case 4.—Female, aged 69, suffering from severe chronic bronchitis. Was very stout, and had a large umbilical hernia which was giving her trouble as it became semi-strangulated. She was given the anæsthetic combined with gas and oxygen. The operation lasted just an hour. Relaxation was good, and the patient recovered consciousness five minutes after cessation of the anæsthetic. The bronchitis was not apparently increased and she made a good recovery.

Case 5.—Male, aged 60, suffering from a perforated gastric ulcer. The diagnosis had not been made for some days, and when seen he was practically moribund, and the radial pulse was not palpable. It was decided, however, that a laparotomy was justifiable, to give him a chance. He was anæsthetized with gas and oxygen and this anæsthetic; breathing and colour considerably improved; a flicker was detected in the radial artery. The operation lasted twenty minutes, during which time a solution of gum-saline was infused intravenously. He recovered consciousness twenty minutes afterwards and lived for twenty-four hours, finally dying from peritonitis.

Case 7.—Male, aged 43, suffering from carcinoma of the colon. Was given the anæsthetic combined with gas and oxygen, and a nearly complete colectomy and anastomosis were performed. The operation lasted one hour twenty-five minutes, and the patient was somewhat collapsed from loss of blood. A saline was given *per rectum* and he rapidly improved. He was conscious twenty minutes from the end of the operation, and had no vomiting or other after effects from the anæsthetic.

Case 25.—Male, aged 14, who had bilateral acute mastoiditis; was very ill. Temperature 104° F., pulse 110, respirations 35; signs at both pulmonary bases. Was induced with the anæsthetic in a Clover's inhaler, and then on an open mask. Both mastoid antra were opened up; the operation was very difficult, lasting two hours ten minutes. The patient regained consciousness one hour after the operation, slept all night, and awoke next morning feeling quite fit, and read a newspaper. No vomiting or after effects; signs at bases of lungs rapidly cleared up, and the temperature, pulse and respiration soon fell to normal.

Case 28.—Male, aged 61, a diabetic, passing large quantities of glucose and acetone bodies in his urine. Gangrene of foot and very calcareous arteries. The femoral was distinctly visible throughout its course in the skiagram. Anæsthetized with the liquid given first in a Clover's inhaler, and then on an open mask. The femoral artery was first ligatured, and the amputation then made through the thigh. The operation lasted forty-five minutes. Half-an-hour afterwards patient had regained consciousness, was not sick, and felt very fit. He had no after-effects whatever.

Case 34.—Female, aged 44; ulcer in œsophagus, thought to be carcinomatous. Intra-tracheal anæsthetic given, and portion of œsophagus containing ulcer excised through an incision in the neck. Operation lasted one hour fifty-five minutes, and beyond one vomit of blood, which had trickled down into the stomach, the patient had no after-effects from the anæsthetic.

Case 54.—Female, aged 45, admitted to hospital with heart failure. When improving slightly developed cholecystitis and became worse in spite of treatment. It was therefore decided to operate. Patient then had auricular fibrillation, as evidenced by grossly irregular pulse, dyspnoea and some cyanosis. I gave her the anæsthetic combined with gas and oxygen which she took very well and she became completely relaxed. A cholecystectomy was rapidly performed, the operation lasting twenty-five minutes. The patient made a very good recovery and her heart was apparently in exactly the same condition as before operation.

Case 118.—Army officer wounded in leg who had had many previous operations under ether. Each time he had been very upset by the anæsthetic, had vomited for some days and complained greatly of the taste and smell. I induced anesthesia by a Clover's inhaler, and continued by the open method. The operation lasted half an hour. As he was coming round and before he was conscious he retched and brought up some mucus. Soon after he regained consciousness he had tea and felt very fit. He had no

vomiting and said he could not taste or smell anything, and expressed great surprise that this was so.

Case 143.—Male, aged 60, brought to hospital with acute cholecystitis, in very bad condition. Pulse 140, respirations 38. Much bronchitis; apex beat in sixth space well outside nipple line; also passing large quantities of sugar. Operation was imperative and it was decided to give this anæsthetic combined with gas and oxygen. He took it very well; on opening the abdomen an empyema of the gall-bladder was found. The operation lasted for three-quarters of an hour; patient regained consciousness in seven minutes and did not vomit or suffer from any after-effects. The bronchitis was not increased, and he made a good recovery.

Case 177.—Female, aged 32, who had previously had a gastro-enterostomy for gastric ulcer. As the trouble recurred it was decided to do a gastrectomy. She was anæsthetized with this anæsthetic combined with gas and oxygen, and good relaxation was obtained. Operation very difficult owing to adhesions from the previous gastro-enterostomy, and lasted two hours forty minutes. At the end of two hours she was becoming slightly collapsed and a gum saline infusion was given intravenously. Her condition then greatly improved, and remained good until end of the operation. After recovering consciousness the patient vomited four times, the material being blood in each case. She had no further vomiting, and made a good recovery.

SUMMARY.

To recapitulate the advantages claimed for this anæsthetic:—

(1) It is less toxic than chloroform or ether, and the safety margin is greater than with either.

(2) It is less irritating to the respiratory passages than ether, and consequently there is less risk of subsequent bronchitis and pneumonia; the induction of anæsthesia is also rendered easier.

(3) Post-anæsthetic vomiting is less than with chloroform or ether.

(4) The taste and smell noticed afterwards by the patient are very much less than with ether and are generally entirely absent.

In conclusion I should like to express my thanks to those surgeons who have afforded me opportunities for taking blood-pressure readings, and to Mr. B. B. Sharpe, late Resident Anæsthetist to St. Bartholomew's Hospital for his help in taking the readings.

DISCUSSION.

Mr. H. E. G. BOYLE said that he could speak of "ethanesal" from the two stand-points, first, of giving it, and secondly of having it administered to himself. His experience of giving the drug was limited to about a dozen cases, and he was quite aware that on so small a number of cases it was quite impossible to give an opinion that might not have to be altered later on; all that he would say now was that in those cases he had been very pleased with the results both during the administration and afterwards. One case in particular came to his mind: it was an operation for the exploration of the gall-bladder in a large and strong man; he gave the "ethanesal" in conjunction with gas and oxygen, running the gases freely through the "ethanesal" and as a result produced a very fine anæsthesia; indeed, the excellence of the relaxation was frankly a very great surprise to him. From the patient's point of view he thought it a delightful anæsthetic. Only a fortnight ago Dr. Hewer had administered "ethanesal" in conjunction with gas and oxygen to him for an operation on his hand. He thought the induction was delightful, and when he "came round" after twenty-five minutes' anæsthesia, and Dr. Hewer had told him that he was quite deeply under, there was just a very faint taste of ether which lasted for about two or three minutes, and after that there was no taste or smell of ether at all. He had a certain amount of frontal headache, but this was easily stopped by 10 gr. of aspirin. He had no nausea whatever and took food an hour and a half after the operation was finished.

Mr. FLEMMING said he wished to give a short account of some experiments which he had carried out with Professor Francis, at the Bristol University, in the fractional distillation of methylated ether. Fractions were collected at the following temperatures: 29° to 30° C., 30° to 32° C., 32° to 33° C., 33° to 34·5° C., and 34·5° to 35·7° C., and clinically it was found that all these fractions had practically equal anæsthetic values. It was not possible, then, to obtain, by mere distillation of methylated ether an ether which was not an anæsthetic. Dr. Mackenzie Wallis had gone further into the matter than when he read his paper before the Medico-Legal Society, on which occasion he attributed the anæsthetic properties of ether to the ethylene contained in it. Messrs. Macfarlan had manufactured for him (Mr. Flemming) an ethylene ether which had given very satisfactory results clinically, twenty consecutive patients not having vomited or complained of nausea. The drug was administered by the open method, by dropping as distinguished from douching, and light anæsthesia was employed in every instance. In all experiments in this connexion the strength of the anæsthetic was estimated by the number of drops per breath required to maintain anæsthesia. His opinion was that when drops were counted and light anæsthesia was employed results might be obtained, even with methylated ether, which were so satisfactory *quâ* after effects that, as Dr. Langton Hewer had found with "ethanesal," there might be very little to choose, in this respect, between ether and nitrous oxide. In reference to Dr. Wallis's contention that pure ether was not an anæsthetic he (Mr. Flemming) would like to know whether ether made from ethyl alcohol was freer from ketones and ethylene than was ether made from methylated alcohol, because he had notes of cases showing that 5 to 6 minims per breath of the former were necessary whereas 3 to 4 minims per breath of the latter sufficed.

Mr. DUNHILL said that he had found this anæsthetic entirely satisfactory from the points of view of patient and of operating surgeon. At the same time he did not quite agree with the strictures which had been passed on ether as an anæsthetic. He had operated with ether alone for fourteen or fifteen years in hospital and in private practice in Australia without finding the faults ascribed to it. Possibly atmospheric conditions were different in England. His loyalty to ether, which had served him well, did not prevent his appreciation of this new preparation.

Mr. GIRLING BALL said that Dr. Hewer had given a very large number of anæsthetics for his operations, and he would like to add a tribute to the value of the new anæsthetic. It was quite true that the patients appeared to vomit less than they did with ordinary ether, and it was noticeable that they did not complain of the taste of the anæsthetic. In addition to that, he (Mr. Ball) testified that he no longer suffered from the taste of anæsthetics which he was in the habit of experiencing previously, after a long afternoon's operations; this was certainly a great advantage to the surgeon. The anæsthetic was a very good one for obtaining relaxation and had been used in several cases of operations on the upper part of the abdomen, a site which was very frequently a difficult one in which to obtain this condition of relaxation.

Mr. A. B. COCKER said that he had used this new anæsthetic, ethanesal, on three occasions. The first case was one of multiple extractions of teeth; atropine was given one hour before; 5 oz. of ethanesal were used; induction ten minutes, open method; no after-effects, nausea, vomiting or headache. The second case was a mammary abscess; no atropine given; about 5 oz. ethanesal were used; very slight mucus and salivation; no after-effects. The third case was one of tonsils and adenoids; patient vomited once some blood, which was swallowed; no other after-effects.

Mr. NORMAN LAKE said that Dr. Hewer had used this anæsthetic in about sixty cases of his at the Queen's Hospital for Children; he was quite satisfied with the results obtained. In particular the children took the anæsthetic quietly, and their condition after serious operations for intussusception was very good. The sisters had reported that the after-effects were very slight.

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SECTION OF BALNEOLOGY AND CLIMATOLOGY.

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Section of Balneology and Climatology.

President—Dr. G. L. PARDINGTON.

Mud Baths and Nephritis.¹

By MAX PORGES, M.D. (Marienbad, Bohemia).

THE establishment of a hospital for nephritis in Marienbad during the war gave me special opportunity for studying the various factors of our treatment in such cases.

Dr. Preminger and myself have already reported on the beneficial influence of calcium and calcium-containing natural springs in certain cases of nephritis, particularly in subacute and chronic glomerular nephritis.

Judging from what I have already observed of the benefit derived from mud baths in cases of gout, especially when localized in the kidneys, I thought it most probable that this form of bath would also be of great value in certain cases of nephritis. Accordingly we tried these baths first in cases of subacute and chronic glomerular nephritis. In the beginning, however, we did not dare to apply them for the sclerotic form, as they seemed contra-indicated by the high blood-pressure, but after experience had shown that the blood-pressure was actually lowered during and after the bath, we decided to treat this form also.

Formerly, it was held that by attracting blood to the skin, the congestion in the kidneys would be lessened, but, as a matter of fact, the reverse is the case. Deleccenne, Lambert, and Wertheimer proved that by cooling down the skin, diminution in the volume of the kidneys and contraction of their vessels as well as a lessening of urine secretion were produced.

Strasser and Wolff made oncometric experiments on a large scale, and proved that if animals are kept in a medium of the temperature of the human body, they show an increased volume in the kidneys, with dilated vessels and increased diuresis. From these experiments, therefore, it is plain that there is no antagonism between the vessels of the skin and the vessels of the kidneys, but that both act in the same direction. It is what we should call a consensual reaction.

There are other facts which prove analogies between the vessels of the skin and of the kidneys. For instance: Nauberg proved that the anatomical structure in the arteries of the skin and of the capsules of the kidneys is alike; and Weiss observed a serpentine twist occurring in the arteries in the matrix of the nails in cases of nephritis.

These facts present an interesting aspect to the aetiology of the so-called war-nephritis, and, indeed, to nephritis in general. There are a great number of well-known authorities (Herxheimer, Yungmann, Knak), who allege the belief that war-nephritis—and even nephritis in general—is due to an infection. On the contrary, we have always held the view that exposure to climatic influences is the instrumental factor in such cases.

Vollhardt and Fah have proved that the primary occurrence in nephritis is

¹ At a meeting of the Section, held December 9, 1920.

not an inflammatory, but an anæmic state, caused by a spasm of the vessels supplying the kidneys.

From the above-mentioned experiments, the chain of proofs seems to be complete, viz. :—

- (1) The cooling down of the skin.
- (2) The contraction of the arteries supplying the kidneys.
- (3) The anæmia of the tissues.
- (4) The secondary degeneration of the cellular elements.

The anatomical picture resulting from the work of Vollhardt and Fah presents an absolutely similar analogy. Siegel was able to produce typical acute nephritis by the direct application of ice to the freely exposed kidneys.

After this aetiological digression we return to our original theme. Strasser and Blumenkranz demonstrated very conclusively that the application of a warm indifferent bath (they employed a bath of from 34° to 35° C. for one to one and a half hours' duration) produced a remarkable increase of diuresis, and also of excretion of sodium chloride in nephritic subjects. Moreover, the excretion of nitrogen in the urine showed a constant, but not quite so marked an increase, while the albumin present was relatively less in amount.

The same influence exerted by indifferent baths upon nephritic patients is shown to an increased extent by the use of special baths, and even more distinctly by the use of mud baths. The experiments of Stark, Dietl, Zörkendorfer, and others, have proved that the action of mud baths is primarily a thermic one. In this respect they are more effective than any other form of bath. Tuskai has proved by an experiment on dogs that mud baths increase metabolism by increasing the excretion of nitrogen, concurrently with greater excretion of chlorides in the urine, and a diminution in acidity; this is borne out in my own experience.

Our investigations show that mud baths have a most intensive influence upon the action of the kidneys in nephritic people, the reason for this influence being the high temperature which can be employed in these baths, and the fact that such temperature remains unchanged for hours at a time on account of their power of storing up heat. I also believe that the chemical properties of mineral mud quicken circulation in the skin, thereby producing a hyperæmia.

Carbonic acid baths exert an influence similar to that of the other varieties of baths, but are not so intensive in their effect.

We have treated fifty cases of nephritis with mud baths, including cases of subacute and chronic glomerular insular nephritis, as well as cases of the sclerotic type, as already mentioned, and in all these instances we found, without exception, that the baths produced a considerable increase of chloride excretion in the urine. This increase would last until the following day, and it only diminished on the second day if the bath treatment were discontinued. If the baths were given in quicker succession (say every alternate day, or two days in succession) the increased excretion of chlorides did not subside at all, but maintained a constant high value, even several weeks after the bath course had been completed.

The amount of urea present in the urine was also increased after the baths, but this augmentation did not last until the following day, nor exceed the period of treatment to any great extent, even if the whole course of baths was taken.

The course of the reaction of the urine was also of some interest in cases of high acidity, its acidity decreased regularly, until it became amphoteric; and where the acidity was less marked at the beginning it became alkaline. This alkalization was in some cases very remarkable, and exceeded the period of bath treatment.

Increased diuresis occurred after every bath, and was maintained until the following day throughout the whole course of baths, and even afterwards for several weeks, coinciding with the period of the increased excretion of chlorides. In spite of this fact, the specific gravity of the urine showed a constant rise after a single bath as well as during the whole course, a proof that it is not a merely mechanical dilution of urine by increased excretion of water that occurs, but that the action of the baths results in heightened activity of the kidney-elements themselves.

The casts and blood corpuscles in the urine were also considerably lessened in number, but we have to be very cautious in considering this fact with relation to the action of the mud baths alone, because we must also take into account the improved conditions under which the patient lives after admission to hospital. Proper diet and the beneficial influence of improved general hygiene may also account for their amelioration in this direction.

As already mentioned, the blood-pressure showed a constant decrease during and after the baths, and the difference in this respect was in some cases amazing, being as much as 50 mm., though generally from 10 to 15 mm.

The pulse-rate during and after the baths was generally accelerated by from twelve to twenty beats, and this continued several hours. A rise of temperature of about 2° C. usually occurred, lasting for three or four hours. One case might here be specially mentioned, in which these fluctuations were particularly marked. In this case, after the ninth bath, an acute attack of gout occurred; there was also typical progressive alkalization of the urine.

The number of baths we gave in each case varied from fifteen to twenty-five. Their temperature was between 36° and 40° C., and their duration from fifteen to sixty minutes.

As a result of our experience and observations, we may draw the following conclusions regarding the action of mud baths.

(1) Under the influence of such baths, there is an increase of diuresis, whilst the specific gravity of the urine remains unchanged, or is, more generally, raised. The increased diuresis lasts over the day of the bath, as does also the higher specific gravity. Moreover, after a continued period of baths, this increase in both respects persists for several weeks.

(2) There is, also, increased excretion of chlorides and nitrogen in the urine, which continues some time, after a single bath has been taken, or still longer after a whole course has been completed. The increase of chlorides lasts longer and is more marked than that of the nitrogen.

(3) A diminution in the acidity of the urine is produced, which sometimes leads to a remarkable degree of alkalization. This phenomenon, too, persists longer than the period of bath treatment.

(4) The blood-pressure is lowered in the baths, the pulse-frequency increases, and the body-temperature is raised. These phenomena, however, are not in evidence beyond the day on which the bath has been taken.

To what conclusions may these observations lead us in the treatment of subacute and chronic glomerular nephritis by a course of mud baths? As we know, the greatest danger to nephritic patients lies in the retention of urinary products in the body; this leads either to uræmia, if nitrogen is retained; or

to œdema in cases of the retention of chlorides. Now, if treatment with mud baths produces a greater excretion of these urinary substances, lasting through the whole course and for a considerable time after its completion, it naturally proves of great advantage to the patient, and is a far milder and more durable method than any therapy in which only medicaments are employed. Moreover, the alkalization of the urine is of great value from a therapeutic standpoint. Hoslin has pointed out that the intensity of albuminuria present, as well as the retention of chlorides and the disturbed functions of the kidneys coincide with the extent of the acidity. He actually speaks of hyperacid nephritis. Also, concurrently with decrease in the acidity of the urine, the other symptoms in certain cases of nephritis also decrease. It may be easily imagined that an alkaline urine would have a far less irritating effect upon the kidney tissues than an acid urine. The underlying cause of this alkalization of the urine is unknown, but we hope to make further experiments in its elucidation. The increased diuresis, accompanied by a higher specific gravity, proves that there is increased activity in the parenchyma of the kidneys, and it is this factor which I consider the most important in our treatment. Assuming Vollhardt's theory of the anæmic ætiology of nephritis, we can easily understand that, heat being stored in the skin, consensual reaction expands the large vessels in the kidneys, anæmia disappears, the cellular elements of the kidneys are better nourished, and the final degeneration will be prevented.

As regards the subjective symptoms, there is not much to report. All the patients felt very well during the baths, and throughout the whole treatment. Occasionally, they complained of fatigue after the baths, but this seemed to pass off after the two hours' rest in bed, which they were ordered to take. The baths had an excellent effect on the typical pain in the back, of which nearly all nephritic patients complain. The frequent muscular and articular pains were also much benefited by the treatment.

There are quite a number of therapeutic factors by means of which we may hope favourably to influence nephritis. We have seen that calcium and calcium-containing waters produce beneficial results in certain cases. We have also seen that in other cases, especially in the sclerotic form, sulphur springs form an excellent means of treatment. Finally, we have shown above that mud baths complete the triad of our therapeutics for the treatment of nephritis. Of course, none of these factors should be regarded as a panacea. In modern balneology, we must differentiate and individualize in order to ascertain which method is best suited to the case in question.

Section of Balneology and Climatology.

President—Dr. G. L. PARDINGTON.

PRESIDENT'S ADDRESS:

Advancing Years and Balneo-therapy.¹

By G. L. PARDINGTON, M.D. (President).

SENESCENCE—I use the word in its primary sense—is a problem that sooner or later must confront every sentient man and woman unless their span of life is unduly shortened. Its importance makes no direct appeal to children, to adolescents, or young adults. But as years go on it becomes a matter of immediate personal concern to each one of us. Nor is it a matter of personal concern only, it affects those around us, especially those who know us most intimately. It is they who notice some of the earliest differences in our demeanour before we ourselves are aware of them. We, on the other hand, are conscious of other changes in ourselves which sometimes we more or less effectually endeavour to conceal—alterations in habits and methods of living, alterations in temperament and outlook on life. We realize that these things are not merely the result of more mature experience, in other words we recognize that we are not quite what we were—not that we are ill, but that our usual standard of health is commencing to alter—in the words of Sir Clifford Allbutt²:—

“The stealthy foot of Time carries us from youth to age so imperceptibly that we are hardly aware of the change; insensibly we shorten our arms, husband our strength, and are willing to think our prowess undiminished.”

It is interesting to consider what these changes are. They may be either anatomical or structural, physiological or functional—due either to the natural processes of involution or to the effect of previous illnesses, and it is by no means easy to distinguish between the two, either anatomically or clinically; indeed it is stated by Nascher that the only demonstrable organic change, entirely due to ageing, is a special form of interstitial fibrosis between the apices of the pyramids of the kidneys, recently described for the first time by Walsh, of Philadelphia. As Charcot says:—

“The change of texture impressed upon the organism by old age sometimes becomes so marked that the physiological and pathological states seem to merge into one another by inscrutable transitions, and cannot be clearly distinguished.”

Injuries and acute infectious diseases may affect the functional integrity of certain vital organs or some other parts, such as the heart, the kidneys or the joints, and so give rise to compensatory changes in other organs, but even if

¹ At a meeting of the Section, held January 27, 1921.

² “Contributions to Medical and Biological Research, dedicated to Sir William Osler,” 1919, vol. i (Proem) p. vii.

they do not do this, they in some way impair the vitality of the system as a whole. The effects of alcohol and syphilis in predisposing to degenerative changes are only too well known to all of us, and such changes as they produce are readily confused with those purely due to advancing years. The effects of over-strain and over-exertion, both mental and bodily, also leave their impress. It is highly probable that the various disturbances in the endocrine secretions, such as suprarenal excess or thyroid deficiency, play an effective part in senescence, as does also the lessened excretion of calcium. But more important still are the results of faulty metabolism and the defective elimination of waste products, and this, too, at the time when the integrity of these functions is of more than usual importance; for in many instances material success in life and increasing leisure at this period often lead to over-indulgence in the pleasures of the table and insufficient care in the matter of physical exercise.

At maturity anatomical structure and physiological function are closely correlated. As time goes on this correlation becomes disturbed: the brain, for instance, attains its maximum weight at about the age of 30 years, whereas mental activity is said to be at its zenith at 50. Diminution in the respiratory capacity begins about the age of 40 but as a rule does not produce any obvious effect until some ten years later.

STRUCTURAL CHANGES.

(1) The most important of the early changes take place in the cardiovascular system, and consist in the hardening and thickening of the medium-sized and small arteries. The initial change is a diffuse hyperplasia of the connective tissues of the intima with a concomitant atrophy of its elastic elements, and hypertrophy of the muscular coat of the media. As a result the vessel becomes thickened and more rigid. Its calibre is diminished sometimes in the small vessels to the extent of obliteration. As these changes progress in the vasa vasorum the nutrition of the larger vessels suffers and their degeneration follows. Atheromatous patches are formed on the inner surface of the intima, and sclerotic fatty and calcareous changes develop in the arterial walls. The sclerosis is diffuse and is most marked in the vessels of the brain, the aorta, the coronary and radial arteries. The muscular and elastic tissue of the veins atrophies; the veins become full and dilated and there is an increasing tendency to varicosity. The real senile change in the heart is one of atrophy, the muscular fibres become smaller and pigmented. More frequently, however, the demands upon the heart have been at this time such as to cause a varying amount of compensatory hypertrophy with changes in the endocardium similar to those appearing in the inner coat of the arteries leading to thickened valves and enlarged orifices.

(2) In the respiratory organs the tendencies are towards atrophy of the lungs with impaired mobility of the chest walls and diminished expansibility. The bronchioles show the effects of the continuous inhalation of atmospheric impurities such as dust. This in time leads to a certain amount of stenosis and pneumoconiosis: the septa of the alveoli atrophy, the air vesicles ultimately coalesce and senile emphysema is gradually induced.

(3) In the alimentary system the teeth decay, become ineffective and fall out; the muscular tissues of the stomach and the intestines atrophy and their walls become thin and dilated; impairment of the circulation causes atrophy of villi and of the glandular structures throughout the gastro-intestinal tract, the secretions of which are correspondingly diminished.

Sclerotic changes occur in the liver, the pancreas, and the spleen, such changes being especially marked in the latter organ. The liver however is frequently engorged from impeded circulation and may be much increased in size, and the gall-bladder and the bile ducts are thickened.

(4) Sclerotic and atrophic changes take place in the kidneys. Here, as elsewhere, the connective tissue is increased at the expense of the parenchyma, and these organs are remarkable as being subject to that special senile change in structure previously referred to. The bladder shows proliferation of the connective tissue and atrophy of the muscular fibres, the changes being irregularly distributed and often giving rise to pouches in its interior, while the sphincter vesicæ is weakened in common with the rest of the musculature of the organ. The prostate enlarges irregularly, all the tissues being involved in a varying degree. The testes undergo changes similar to those in other secretory organs, the increase in connective tissue compressing the glandular structures.

(5) Atrophic and degenerative changes develop in the brain, the atrophy specially affecting the cortex; the convolutions shrink, the fissures become shallower, the nerve fibres attenuated and the cells shrunken. The brain is denser, the pia mater is thickened and there is an increase of cerebro-spinal fluid. The atheromatous changes in the vessels are more marked than in any other organ; sometimes miliary aneurysms and spots of softening occur in their course. Round the lymph vessels minute cavities are formed; these cavities were formerly supposed to be perivascular spaces.

The changes in the spinal cord resemble those in the brain; there is atrophy of the cells in the anterior horns, the pyramids, and some of the posterior fibres, a decrease of nerve tissue, an increase in connective tissue and an increase in the cerebro-spinal fluid. Degeneration occurs in the end-organs and terminal fibres of the peripheral nerves, and it progresses centripetally. Degenerative changes also occur in the end-organs of special sense and in the organs of special sense themselves. Thus, there is atrophy of the Schneiderian membrane, opacity in the crystalline lens, with impaired musculature of the eyeball, and sclerotic and atrophic changes in the auditory apparatus.

(6) In the osseous system there is an increase in organic and a decrease of inorganic matter leading to the condition known as osteoporosis. The bones become brittle and more liable to fracture, changes in their shape occur, especially in the lower jaw, the pelvis, and the neck of the femur; the cranial bones become thinner, the spinal column is shortened and its curvature is altered, especially in the dorsal region, owing to the changes in the inter-vertebral discs, which lose their resiliency and begin to calcify about the fiftieth year.

The cartilages waste and ossify, the ossification of the costal cartilages gives rise to rigidity of the thorax, and the chest assumes the senile shape, becoming longer in front, shorter at the back and flattened at the sides. This change in shape is largely due to the new position taken up by the ribs in order to accommodate themselves to their altered vertebral articulations.

The ligaments thicken and contract, thus interfering with the mobility of the joints, a condition which is often confused with immobility from other causes.

(7) In the muscles the fibres are imperfectly repaired, primary atrophy occurs in those most actively employed, whilst those less frequently used undergo atrophy which is secondary to fatty infiltration, striped muscular tissue degenerating earlier than the unstriped variety.

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The senile change in the muscles was first described by Kölliker as follows:—

"In old age there is a true atrophy of the muscles, the fibres become more slender, yellow and brown granules and globular nuclei are deposited in their substance and they present signs of active division such as are found in embryonic tissue."

(8) The skin becomes dry, loose and flabby, cold from impaired circulation, and pale in colour when not pigmented. There is however a tendency to pigmentation and also to the formation of patches of hypertrophy, warts, and capillary nævi. Folds and wrinkles are developed owing to the loss of subcutaneous fat and elastic fibres. The glandular elements atrophy and there is a change in the character of the secretions. The sensibility is also affected from degeneration of the nerve endings. The nails become dry and brittle and are apt to crack and there is atrophy of the hair bulbs and loss of pigment in the hair, which tends to fall out.

FUNCTIONAL CHANGES.

Generally speaking these structural changes are all of the atrophic or degenerative type. The tissue cells are altered, the repair does not keep pace with the waste, there is a diminished formation of new elements, especially those of the higher or more complex type—the parenchymatous elements—and a relatively increased formation of the simpler or lower elements, the result of which is a poorer make up. This leads to a gradual diminution in functional activity. There is, as Dr. Parkes Weber so aptly puts it, "atrophy of function." Diminished activity is shown by lessened elimination and altered metabolism; diminished power is manifested by more rapid fatigue and proportionately greater effort necessary to perform a given amount of work. There is a diminution also of vital resistance and recuperative power, which accounts for the greater liability to, and tardier recovery from, certain diseases, and the inability to withstand the effects of extreme change. The margin between functional activity and functional capacity is reduced, and the limit of capacity is reached before muscular exhaustion becomes apparent. Vital energy, automatic activity, and reflex action are alike impaired and a greater stimulus is required to bring about a given response; this is shown by the anomalous febrile reaction in some elderly people and the latency of symptoms in many acute diseases such as pneumonia.

The functional changes in the circulation correspond generally with the structural alterations and are of course of supreme importance in advancing years. Anything that favours an increase in the blood-pressure initiates a change in the cardiovascular mechanism, and as age advances many events occur which tend in this direction. The vascular changes associated with retarded blood flow, the functional torpor leading to changes in metabolism and elimination and to renal and hepatic inadequacy, and the disturbed balance of endocrine secretions—these are more or less natural tendencies; but to these must be added, as avoidable causes, over-indulgence in food and alcohol, and over-exertion both mental and physical. Again, the possible effects of gouty and rheumatic tendencies, previous alcoholic excess and syphilis, must be taken into account, and lastly the toxæmia produced by absorption of bacterial products from the large intestine to which Metchnikoff attaches so much importance. Normally the pulse is gradually diminished in frequency until extreme age is reached, when the rate again rises, but it is very easily affected by slight causes. Its character also is changed by the loss of elasticity in the

blood-vessels and the altered blood-pressure. The blood-pressure remains high so long as the heart responds to the increasing demands made upon it, but as compensation fails the pressure falls and the pulse becomes slower. The blood-count is very variable but there is sometimes a tendency to anæmia. The proportion of salts in the blood is altered. There is increasing viscosity and increased calcium retention, the blood is also less perfectly aerated owing to pulmonary changes. The imperfectly aerated blood passes with greater difficulty through the capillaries, the *vis a tergo* in the veins is thus diminished, the *vis a fronte* is also diminished by pulmonary changes and the veins in consequence become fuller and the blood-current retarded.

The changes in the lungs and the thoracic walls interfere with the due performance of respiration; the respiratory capacity, which normally diminishes from the fourth decade onwards, begins to manifest itself and shortness of breath is more easily induced. The respirations are increased in frequency to compensate for their diminished amplitude, which is brought about by the increasing rigidity of the thorax and the gradual onset of senile emphysema, and the breathing becomes more abdominal and less costal. The vital capacity and the tidal air are alike diminished and there is a gradually progressive diminution in the excretion of CO_2 .

In the alimentary system taste is impaired or vitiated, mastication is imperfectly performed and the food is retained longer in the stomach, the movements and secretions of which are beginning to be impaired whilst the torpor of the intestines and diminished peristalsis give rise to constipation and faecal retention, associated with which is frequently irritative diarrhoea. Intestinal stasis may be thus set up with all its attendant evils. Lessened bodily activity demands a lessened food supply, but as the reverse of this often obtains a further stress is thrown upon the already weakened digestive organs. The bile becomes more viscid and there is an increasing tendency to cholelithiasis, a point which was especially insisted upon by Trousseau.

Renal activity is curtailed, less urine excreted, the specific gravity is lower and the solid constituents are diminished, the output of urea sometimes becoming as low as 125 gr. *per diem*. Occasionally there are traces of albumin and sugar, but these are not necessarily of any clinical importance.

Owing to the vesical and prostatic changes the bladder becomes less able completely to expel its contents, the urine tends to be retained and to become decomposed, with all the troubles resulting from this condition. The sphincter vesicæ becomes incompetent with consequent dribbling of the urine.

The decline in sexual power varies considerably, but the testes may remain functionally active until quite late in life.

In the nervous system many changes may be obvious without any corresponding anatomical defect; the earliest symptoms are altered and impaired mental activity, the mental processes are slower, there is a lessened capacity for work and mental concentration, which is attended with greater effort, there is lessened co-ordination, and there are impaired afferent and efferent impulses and diminished reflex response to stimuli, the tendon reflexes are diminished and the latent period is increased. Sensibility is impaired or perverted both by the degeneration of the peripheral nerve-endings and tactile nerve organs, and also by impaired perception in the brain. There is also a tendency to tremor. The muscular cramps and paresthesiæ frequently complained of are, however, generally due to changes in the peripheral circulation.

Memory becomes weakened especially for recent events, names and words; there is a change in temperament, with a tendency to pre-occupation and loss of control over the emotions. The growing indifference to surroundings and carelessness with regard to personal habits, so frequently to be observed, are generally due to an automatic effort to avoid fatigue. Senile changes in blood-vessels tend to thrombosis, minute emboli and foci of softening. The thermotaxic and vasomotor mechanisms are less efficient and there is a sensation of chilliness. There is less heat production but the temperature is maintained at its normal level, which, as Chareot points out, is due to diminished heat loss from the skin, which becomes drier and less vascular as age advances. He has also pointed out that there is a distinct increase in the difference between the rectal and axillary temperatures. The special senses are blunted, partly by anatomical changes and partly by a lessened perceptive faculty. In the eye the power of accommodation is weakened and the pupil reflex is less brisk.

In the locomotor system impaired muscular power and increased muscular fatigue gradually become manifest; the thickening and contraction of the articular ligaments give rise to impaired mobility, and there is a change of gait. At this time also the effects of fibrositis, myositis, perineuritis and changes in the articular structures, all have to be taken into account as interfering with ease of movement.

VITAL FORCE.

The question why, after a period of more or less mature perfection of body and mind, our tissues degenerate and our functions fail until they become inadequate for the maintenance of life, is one of the great problems of our existence, and as such has occupied the minds of men from time immemorial. Many theories have been advanced towards its solution but few facts are known.

The nature of vital force is unknown to us. All we do know is that life depends on cell activity, that is, on that property possessed by our protoplasm, which we call irritability. Ageing itself is a manifestation of life. The body does not become worn out by normal activity, for organs and tissues that are seldom or never used in one individual undergo the same changes and degenerations that occur in those of another individual in whom they have been actively employed.

Among the theories of more modern times is that of Thoma, who considers that the ceaseless activity of the cardiovascular apparatus weakens the elastic fibres of the vessels. This leads to their dilatation and lessened contractile power, and nutrition is impaired in this way.

Demange ascribed the cause of senescence to a change in the quality and quantity of interstitial nutritive material owing to the alterations in the circulation due to atheroma and arteriosclerosis. The origin of the initial change he believed to be the constant friction of the blood against the inner coat of the vasa vasorum, which irritates the endothelium and ultimately sets up endarteritis; this in its turn leading to obliteration, a condition which Martin found gave rise to necrotic infarcts in the larger vessels which they supplied.

Victor Horsley's view was that degeneration of the thyroid gland was largely responsible for senile change; Lorand and others have attached similar importance to failure in the other ductless glands and recent experimental work has again drawn attention to this aspect of the subject. True arterial atheroma has been experimentally produced by the injection of adrenalin and also by nicotine. Lorand argues that the part played by the

degeneration of the endocrine glands, which regulate the nutrition of the body in the causation of senility, is dependent upon the power they have of destroying or neutralizing certain poisons which have gained an entrance to the system; but none of these observers explain what is the fundamental cause of the changes in the glands themselves.

Bütschli has suggested that the life of cells is maintained by a specific vital ferment which gradually becomes feebler in proportion to the amount of cell reproduction effected.

Durand-Fardel's view is based upon the assumption of a vital principle of limited duration; he believes that when the organism has fulfilled its function of reproducing the species, and thus perpetuating the race, there is no further object in its existence.

According to Weismann old age depends upon a limitation in the power of reproduction in the cells, so that a time comes when the body can no longer replace the wastage of cells which is the inevitable accompaniment of life, for Minot has determined that as the rate of growth from birth onward gradually diminishes so the power of reproduction also progressively diminishes until a point is necessarily reached when the organism, being no longer able to repair itself, begins to atrophy and degenerate.

Nascher has advanced the theory that the fundamental cause of ageing is tissue-cell involution, and that there is a progressive evolution in cell life, each new generation of cells differing from its predecessor. At the period of maturity the cells attain their highest state of perfection, and at this time they are adapted exactly to their surroundings and available nutrition, and so are perfectly fitted to perform their functions; whereas later generations of cells are less perfectly adapted to their surroundings; their power of reproduction is less perfect, and thus fewer and poorer cells are produced; ultimately the cells become so imperfect and ill adapted to the conditions under which they exist that either reproduction ceases or is so feebly performed that the organs of which the cells are composed become less and less fitted to perform their functions and they finally shrink: thus the altered properties of senile cells accounts for the altered metabolism in advancing years. He also holds the view that different kinds of cells have different periods of evolution, and in support of this he instances the difference between the period of evolution in the cells of the thymus gland and that in the connective tissue cells.

Nascher also attaches great importance to the progressive effects of pneumoconiosis as a factor in the production of senile changes.

Metchnikoff strenuously opposes these views: he contends that there is no general cessation of the power of cell reproduction in old age. He points out that the hair and the nails, which are epidermic outgrowths, continue to grow throughout life, their growth being due to the proliferation of their constituent cells and that the hairs on some parts of the body increase in number in old people. "I think it is indubitable" he says, in his book on "The Prolongation of Life,"¹ "that in senescence the most active factor is some alteration in the higher cells of the body accompanied by a destruction of these cells by macrophages which gradually usurp the places of the higher elements and replace them by fibrous tissue." This process of phagocytosis, he avers, affects the different organs in the system; for instance, the loss of colouring matter in the hair is due to the action of certain cells called chromophages. In support of his theory he relies upon the investigations of his associates

¹ "The Prolongation of Life," Engl. trans., 1907, p. 35.

and himself in certain cases of hydrophobia; these showed that the nerve cells and the cerebro-spinal ganglia affected in such cases were absorbed by neuronophages; and by the aid of a very delicate mode of preparation M. Mamouélian has shown that in senile brains the granules of the nerve cells are similarly destroyed. "In senile degeneration," he says, "the nerve cells are devoured by neuronophages which absorb their contents and bring about more or less complete atrophy. The bleaching of the hair and the atrophy of the brain in old age thus furnish important arguments against the view that senescence is the result of the arrest of the reproductive power of the cells. Hairs grow old and become white without ceasing to grow, and the cessation of the power of reproduction cannot be the cause of the senescence of brain cells, for these cells do not reproduce even in youth." Similar processes, he shows, go on in the muscular fibre where there is a destruction of the contractile material by myophages. Again, osteoporosis is brought about by the agency of cells similar to macrophages and known as osteoclasts, which remove the lime from the bones and convey it into the general circulation, whence it is transferred to other tissues, especially to the walls of the blood-vessels, thus leading to senile atheroma.

Durand-Fardel and Sauvage have emphasized the coincidence of this senile change in the bones and the atheromatous lesions in the arteries. Metchnikoff has also pointed out that the testes seem to be the organs which longest resist the action of phagocytes, and this would seem to be in accord with the fact that they often remain functionally active until quite late in life.

The conditions with which we have to deal in senescence are all mainly associated with the altered or perverted nutrition we have been considering. The nutrition of the body as a whole is dependent on the nutrition of the various tissues and organs composing it, and these again upon that of the cells of which they are built up. Every cell possesses the property of taking up from the fluid medium by which it is surrounded the substances which are necessary for its vital activity and also the property of casting out the waste products; there is going on in the cells a continuous process of constructive and destructive metabolism, and in health this constant adaptation of repair to waste is perfectly balanced. This fluid medium which surrounds every cell in the body is a transudation from the blood, and therefore one of the chief causes of impaired nutrition is a deficiency in supply or a deficiency in quality of that element; another cause is a failure on the part of the organism to eliminate the waste products that accumulate. The cells, moreover, are interdependent upon one another and upon the blood circulating through them, which also serves as the medium for bringing into harmonious relationship the several effects of their vital activities. There is thus an interdependence of all the tissues, and upon the integrity of this correlation the maintenance of the structural and functional integrity of the system depends.

Now any deviation from health is due to some failure on the part of the organism to maintain itself in that state of physiological equilibrium we have just considered. What are the means at our disposal to prevent or anticipate this failure, or to minimize its effects? The scope of medication here is limited to the correction of some transient abnormal process, and we have to rely on the great general therapeutic principles: hygiene in its widest sense, regulation in diet and methods of living, recreation, work, rest, and exercise. These are not all easy to compass, the latter especially, and it is here, I think, that balneotherapy finds one of its most effective uses.

Balneo-therapy, which of course includes hydro-therapy, consists essentially in the application to the body surface of thermal and mechanical stimuli by the medium of water in its various physical states, by the medium of air, and also by the rays of the electric incandescent light. The action of these stimuli is that of irritants to the peripheral sensory nerve-endings in the skin; the irritation induced being conveyed by afferent fibres to the central nervous system and thence reflected through the efferent fibres to the various parts which we desire to influence. Local innervation is also affected by the direct action of these stimuli on the ganglia, which have been demonstrated by Goltz, Vulpian and others in the nerve supply of the vessels.

In this connexion it is desirable to bear in mind the vascular and nervous supply of the skin. The blood-vessels terminate in a network of capillary loops which are distributed in great profusion between the two layers of the corium and between the corium and the subcutaneous tissues. The capillaries have no elastic coat; this lack is however compensated for by the elastic tissues of the skin itself by which they are supported. These elastic fibres, which according to Meissner gradually begin to disappear as senile changes take place in the vessels, are so arranged that they oppose and regulate the effects of vaso-constriction. The arterioles have very little muscular tissue in their walls, but here again this is reinforced by the oblique involuntary cutaneous muscular fibres and also by the *erectores pili*; for as Thoma and Unna have pointed out these minute muscles act as tensors and retractors of the skin and so aid in completely emptying the smallest vessels in the papillary layer.

For some time past evidence has been accumulating which indicates that the arterioles, the capillaries and probably the venules are an auxiliary source of propulsion in the circulatory mechanism. Schiff showed long ago that there is a rhythmic contraction of the arteries in mammals as well as in amphibians. Stricker observed contraction of the capillaries, and this has been confirmed by Roy and Graham Brown, and Severini considered the contraction of the nuclei in their walls to have an important influence upon the blood-current. Kellogg maintains that the arterioles are especially active in this direction, while some other observers contend that these small vessels are in constant peristaltic action. Professor Woods Hutchinson's view is that in the blood-vessels of the skin and subcutaneous tissues we have in the higher vertebrata, just as in the lower forms of life, a great peripheral or as he terms it a "skin heart," which plays a very important rôle in the circulatory apparatus. In any case it is obvious that the alternating contraction and dilatation of this enormous network of vessels—the aggregate capacity of which is equal to 30 per cent. of the whole volume of blood in the body—must when brought into play by appropriate thermal stimuli exercise a very massive effect upon the circulation of the blood, and materially assist and supplement cardiac action.

The nervous supply of the skin is extremely varied and abundant. In addition to the vasomotor, sympathetic and secretory fibres there are also the nerves conveying painful impressions and the nerves of tactile and thermic sense. The terminals of this latter group, some of which are highly specialized in structure, stand guard as it were over most of the functions of the body. They are constantly exposed to various irritants from without such as heat and cold which they convey to the vasomotor, cardiac, respiratory and motor centres and so to the muscles themselves and arouse in them by reflex action various forms of protective response.

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The acuity of the nerves of tactile sense as tested by the æsthesiometer is increased by moderate temperatures (its optimum point being 95° F.) but it is diminished by definitely hot or cold applications.

The nerves of thermic sense end in certain points in the skin which have been termed hot spots and cold spots. Of these the cold spots are the more numerous and they are the more easily and rapidly stimulated. The fibres connected with these points serve to convey the impressions of heat and cold respectively and are connected with certain centres in the brain and cord, presumably associated with the thermo-taxis mechanism. The thermic sense which is easily fatigued is most delicate between 80° F. and 90° F., and its power of differentiation is said to be considerably increased by practice, a fact that I myself, and I have no doubt most of you, have confirmed. Its acuity varies considerably in different regions and it is more responsive to sudden than gradual changes in temperature, being most powerfully affected by the rapid alternation of very hot and very cold stimuli. Heat and cold are perceived by the nervous system as specific hot and cold sensations only within certain limits, above and below which the sensations become confused, and at still higher or still lower temperatures the perceptions become those of pain.

EFFECTS OF THERMAL STIMULI.

The effects of thermal stimuli vary (1) with the temperature, (2) with the duration, (3) with the area involved, (4) with the technique, (5) with the patient's condition. The first four of these factors are of course under our control, and should always be regulated with extreme precision, the necessity for which becomes increasingly important in advancing years; the fifth demands the closest scrutiny before any balneotherapeutic measure can be prescribed with success or sometimes even with safety.

(1) *Temperature.*—The intensity of stimulation varies directly with the difference between the temperature of the skin and the temperature of the application. The nearer these approximate the less is the stimulus, and when the so-called indifferent or neutral zone (92° F. to 95° F.) is reached the effect is no longer stimulating but soothing.

The temperature of the skin has been carefully studied by Künkel who found that it varied between 83·5° F. at the tip of the ear to 95·5° F. in the pectoral region, the average being about 90° F., and this point forms the zero of thermal stimuli, the temperature of which may be roughly classified for convenience as follows :—

Upwards	Downwards
From the zero upwards, 90° to 96° F.— <i>warm</i>	From 90° to 78° F.— <i>cool</i>
From 98° to 104° F.— <i>hot</i>	From 78° to 60° F.— <i>cold</i>
Above 104° F.— <i>very hot</i>	Below 60° F.— <i>very cold</i>

It will be observed that the part of the scale comprised in the two central divisions, namely, from 78° F. to 98° F., one on either side of the zero, corresponds pretty closely to the range of epicritic sense, and it may be that the effects of stimuli within this area differ specifically as well as thermally from those outside it.

Senescence involves the liability to arterio-sclerosis and allied forms of degeneration; the skin is less active and less elastic; its thermic and circulatory reactions are impaired, and individuals in this category withstand very poorly the initial shock of cold applications, neither can they support the depletion caused by excessive diaphoresis; therefore all extremes of temperature must be avoided and thermal changes carefully graduated.

(2) *Duration*.—The duration of any balneotherapeutic procedure should as a rule vary inversely with the intensity of the thermal stimulation employed; more especially does this apply to the lower ranges of temperature. The longer the duration the more potent is the primary effect, and unless judiciously controlled the secondary or reactive effect may be materially interfered with, and undesired and undesirable results obtained.

When using decidedly cold or hot applications a few seconds may suffice, except perhaps in the case of local applications, such as douches, where the mechanical effects of pressure and vibration are superadded, here the time may be perhaps extended to thirty seconds.

The duration of moderately hot or cold applications may be measured in minutes. The neutral bath (95° F.) may be employed as long as circumstances require; for a general sedative effect twenty to thirty minutes should suffice.

(3) *Area*.—The greater the surface involved in the measure employed the more massive is the effect. Goldscheider and Charcot have pointed out that some parts of the surface are less sensitive to cold than others, for instance, the skin overlying the vertebral column: hence the suitability of douches for use in this region. Generally speaking, those cutaneous areas which have the best vascular supply yield the best response to cold applications. The cutaneous vascular supply over the anterior and external parts of the lower limbs is relatively very poor, hence cold applications to this region are seldom desirable.

The locality is also of importance. Special reflex vascular effects are obtainable by the stimulation of certain areas which have been worked out by Winternitz, Brown Sequard and others. The most noteworthy of these associated areas are:—

- (a) The face, the forehead and back of the neck in connexion with the brain.
- (b) The hands and feet in connexion with the brain, nasal mucous membrane and thoracic organs.
- (c) The chest and shoulders, upper dorsal spines, and inner surface of the thighs in connexion with the lungs.
- (d) The lower and middle dorsal region in connexion with the stomach.
- (e) The upper lumbar region and lower part of the sternum in connexion with the kidneys.
- (f) The lower lumbar region in connexion with the pelvic organs.
- (g) The feet and inner surface of the thighs in connexion with the urinary organs.
- (h) The skin over the spleen, intestines, liver and bladder in connexion with the underlying viscera.

(4) *Technique*.—Precision in details of administration influences very largely the attainment of the desired result of any balneotherapeutic measure. The bath chamber itself should be thoroughly ventilated, plentifully supplied with fresh air, and warmed to a temperature of about 75° F. In senescence it is desirable to avoid a constrained or stooping position and during the administration of any cold application (with the exception of the wet pack) the subject should stand either on a hot pad or in a shallow hot foot bath, and a preliminary cold affusion should be made to the head. No procedure below the neutral temperature, especially in simple immersion baths, should be administered without friction, which should be carried out by the patient himself as well as by an attendant if one is available, and the lower the temperature of the bath the more vigorous the friction should be. It enhances the effect of all baths and is one of the most important aids in eliciting a good reaction.

Any bath involving the use of cold water should be preceded by a short general hot application. For this purpose a hot dripping sheet, a hot spray or needle bath, or a short hot air bath, are all useful, and in some cases nothing is better than the radiant heat cabinet bath for five minutes at a temperature of 105° to 110° F. After all cold applications the subject should be thoroughly dried with a hot Turkish sheet with friction of the skin and percussion with the flat of the hand over the spine. Now is pre-eminently the time when properly arranged breathing exercises—which are so important in middle life and afterwards—can be most advantageously practised; they should be followed, as soon as possible after dressing, by short brisk walking exercise in the fresh air.

After a hot or neutral bath the patient should be wrapped in a *warm* Turkish sheet and gently dried without friction; and he should rest quietly in the recumbent position until the circulatory equilibrium is restored, in order to avoid any atonic reaction with consequent prolonged heat loss.

In those measures involving percussion and vibration it is extremely important that the force of water should be adequate, 20 to 30 lb. to the square inch. They are then highly effective, but with a poor pressure they are refrigerating and depressing to an alarming degree.

THE CONDITION OF THE PATIENT.

A careful estimate should be made of the general condition of the patient, more especially with reference to the cardiovascular apparatus, the blood-pressure, and the possible existence of anæmia, the state of the lungs, the kidneys and the excretory organs. The nervous system should be investigated and it should be noted whether there be any indication of exhaustion, mental or physical, loss of sleep, apprehension or a sense of chilliness, and attention should be paid to the state of nutrition, the power of resistance to cold, and the age of the patient. It is not the actual age alone however that has to be considered. Individual predisposition, previous habits of life and the general standard of health must be taken into account. We have all of us seen persons advanced in years whose reactive capacity was distinctly brisker than that of other quite healthy subjects many years their junior.

It is desirable to estimate as far as possible this reactive capacity, and various attempts have been made in this direction. The two following tests have been suggested: (1) A compress wrung out of iced water is applied to a small area for one minute; the part is then dried by contact but without friction, and covered with a dry towel. Normally, reaction ought to be completed in two minutes. (2) The response of the circulation to mechanical irritation. The phenomenon known as dermatographism indicates a disordered state of the vaso-motor nervous system, and therefore impaired reaction, and this fact has been made use of in determining reactive capacity. The rapidity with which the red line develops after the finger nail has been passed along the skin of the abdomen, and the pressure required to produce it, form a crude test. Prolonged pallor indicates abnormal irritability of the vaso-motor nerves or the ganglia of the small vessels; whereas prolonged redness means loss of tone.

PHYSIOLOGICAL EFFECTS OF THERMAL AGENTS.

Very numerous experiments and observations have been made with a view of determining the physiological effects of various thermal applications, some of the more important of which may be here referred to:—

(a) Circulation.

Schüller showed by experiment that cold wet compresses applied to the abdomen or spine of trephined rabbits invariably caused a dilatation of the vessels of the pia mater. The pulsations were more pronounced and slower. Respirations were also slower and deeper, whereas hot compresses produced exactly the opposite effects. Similar results were observed after immersion baths which varied in degree and duration with the amount of surface involved.

Vinaj was enabled to corroborate these results by observation on the human subject.

Müller found that cold baths increased the blood-pressure and lessened the frequency of the pulse; warm baths caused a slight initial rise in the blood-pressure followed by a fall, the fall being most prolonged after baths at neutral temperatures. Very hot baths increased the blood-pressure and the frequency of the pulse, the latter result being due to cardiac stimulation. In baths involving active motion the mechanical effects seemed to predominate, so that in the case of the douche the effects on the blood-pressure were not so marked or of such long duration.

Kellogg, who has made numerous observations on this subject, Stradberger and others have confirmed these results.

Winternitz, Rovighi and others found that cold baths of all types increased the leucocyte count, the red cells, and the hæmoglobin; whilst hot baths diminished them, but localized hot procedures caused leucocytosis at the point of application.

Burton-Opitz showed that cold baths increased the viscosity of the blood: but that hot baths lessened it.

Strässer showed that cold baths increased the alkalinity of the blood; hot baths diminished it and increased the acidity of the urine.

Wright found that after a course of short cold baths the opsonic index was increased.

(b) Respiration.

Rübner found that both cold and very hot baths gave rise to a decided increase in the respiratory function; moderately hot baths diminished it; whilst neutral baths had very little if any influence. Most marked results were obtained by the cold douche which nearly doubled the effect. After a transient quickening the respiration became slower and deeper, the lungs were more fully expanded and the tidal air increased.

(c) Muscular System.

Short cold applications increase the tone and energy of voluntary and involuntary muscles. Warm applications diminish the capacity for work, decrease muscular excitability and irritability, relieve spasm and alleviate fatigue. Protoplasmic activity is directly increased by warmth but oxidation of tissue waste is lessened and so fatigue products may accumulate and lead to exhaustion.

Vinaj and Maggiore working with the ergograph have demonstrated that an immersion bath of 50° F. for fifteen seconds distinctly increased the capacity for muscular work, whilst a bath at 96° F. for five minutes gradually cooled to 68° F. more than doubled the capacity. The application of a cold wet sheet with friction not only removed the fatigue but increased the capacity beyond the usual curve. Warm applications, when not combined with mechanical

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measures, diminished the capacity for muscular work, but warm frictions, affusions and douches restored the muscular capacity, though to a lessened extent than cold applications.

(d) *Nutrition.*

Fleury has determined that cold applications increased the absorption from the intestinal tract.

Röhrig and Zuntz showed that tissue metamorphosis is increased by reflex stimulation of the muscles by cold.

Strasser found that a course of baths either hot or cold or alternating, and hot-air or vapour baths followed by cold applications, caused an increase in the urinary excretion of urea, uric acid, ammonia and earthy phosphates. Waste products were more completely oxidized, and the proportion of imperfectly oxidized products diminished.

(e) *The Nervous System.*

Cold primarily diminishes nerve activity and sensibility, secondarily it increases both as is evident in the enhanced briskness of the knee jerk after a cold bath. Heat excites or exhausts according to the temperature and method employed; moderate heat is soothing.

Rübner by a calorimetrical experiment has shown that cold applications stimulate heat production and tissue oxidation and Johansson has pointed out that this increased oxidation occurs only when muscular tension is increased or shivering induced, and is therefore due to the effect of motor reflexes upon the skeletal muscles.

COLD.

The primary effect of a cold general application is a contraction of the peripheral vessels of the skin and a general reduction of the surface temperature. Perspiration is checked and the elimination of heat diminished. Coincidentally a temporary congestion of the underlying tissues and internal organs is set up, accompanied by an increase in their functional activity. The effect on the peripheral terminations of the sensory nerves results in a powerful stimulation of the central nervous system, the reflex effects of which are evidenced by the gasping respiration, the increased cardiac action, and the impulsive muscular movements. If these muscular movements are restrained, shivering—which is an involuntary action of the voluntary muscles—is set up; in either case an increase in heat production results. The respiratory centre is very easily stimulated and the respirations after the initial shock are temporarily quickened; the pulse is also quickened and the blood pressure raised. The system is now roused to meet the effects of cold, and if after a short time its application is suspended the condition known as reaction occurs. The cardiac contractions become slower and more forcible, and, aided by the response of the cutaneous vessels, which actively dilate, the circulation is carried on with renewed vigour, respiration becomes slower and deeper, and the feeling of chilliness is succeeded by that of warmth and general exhilaration, which continues so long as increased heat production lasts. This reaction is the expression of a physiological resistance to the effects which are primarily induced by the action of cold on the tissues, and its complete attainment is the object to be aimed at in all general tonic procedures, the endeavour being to train the patient to react to stimuli at as low a temperature as possible compatible with his condition; in those past the meridian this demands increasing

attention and careful graduation of the various methods employed in order to secure its successful accomplishment.

The results of good reaction may be thus summarized: The sympathetic system, which is intimately concerned with nutrition, is profoundly stimulated. The vaso-motor system undergoes a form of gymnastic exercise which trains and develops the contractile power of the peripheral vessels and the activity of the cutaneous circulation; witness the freshness of the colour and the complexion. The thermotaxic mechanism is improved and the power of resistance to chills increased. There is an improvement in the quality of the blood, the heart acts with more vigour and the circulation as a whole is brisker. There is an amplification of the respiratory excursus, the tidal air is increased as are also the amount of O absorbed and the CO₂ eliminated. The appetite, digestion, assimilation and nutrition are all improved, there is a more active metabolism and more perfect elimination, and an increase in that ability of the system to maintain itself in health under adverse circumstances which we call vital resistance.

We have however to be alive to the possibility of *untoward results*, such as deficient reaction. This is indicated by pallor, coldness of the skin and extremities, a sense of chilliness, faintness, weakness, nervousness, depression, giddiness and headache; when observed it calls for the immediate use of some hot application, a hot drink and subsequently plenty of warm clothing.

Excessive reaction is shown by over-excitation of the heart, palpitation, a sensation of heat, fullness in the head, throbbing headache, and profuse sweating; it should be met by a general cold application at a temperature of from 80° to 65° F.

The above are encountered immediately, but there are others the manifestation of which is more remote.

Excessive Tissue Change.—This is indicated by loss of weight accompanied by loss of strength, and loss of appetite, and is due in most cases to prolonged or over-active treatment.

Dyspnoea usually points to some overlooked emphysema or asthmatic tendency.

Pain.—This may be due to some temporary awakening of a latent chronic neuralgia such as sciatica or pleurodynia; here the cause is generally incomplete reaction.

Headache is due to excessive cerebral excitation following too intense an application. Other effects of the same cause are sleeplessness, nervous depression, giddiness, faintness or palpitation. When any of these symptoms are in evidence the prescription must be rearranged accordingly.

HEAT.

The immediate effect of hot applications (below 104° F.) is relaxation. The blood-vessels and lymphatics of the skin are dilated and the rate of blood current is retarded. The heart is at first slowed, subsequently it is quickened, loses force, and the blood-pressure is reduced.

By surrounding the patient with a medium hotter than the body, his temperature is at first increased both by diminishing the heat loss which normally occurs by evaporation and radiation, and by directly supplying heat to the parts with which it is in contact. Subsequently, however, from the reflex increase in the vascular area of the skin and the stimulation of the sweat glands the heat loss after the bath is much increased. Very hot applications cause a contraction of the peripheral vessels but the subsequent reaction is of

an atonic character and quite different from that following the applications of cold, as Baruch and others have shown by sphygmographical observations.

Heat directly promotes functional activity, cold increases it by reflex stimulation—thus in persons with an adequate reactive power cold applications are beneficial in eliciting and developing the latent power of response and resistance, whereas in those who are enfeebled or debilitated, in whom the power of reaction is poor, or in those who are temporarily enervated by violent exercise, warmth induces a refreshing and invigorating effect without making any additional call on the nervous system.

GENERAL INDICATIONS FOR BALNEOTHERAPY IN SENESCENCE.

The indications for the employment of hot and cold measures will be sufficiently obvious from what has been said, and time does not permit me to go into details of the methods at our command; but a few general suggestions may be made. Disordered metabolism of some kind is usually the initial phase in the untoward conditions which beset advancing years, and cold tonic measures generally are here of great value, but, as before stated, they must be carefully graduated in every detail. A course of the simplest and least stimulating measures, such as sponging and wet sheet friction, may have to be used as a preliminary before the more strenuous procedures such as the needle bath, the half bath or douches can be employed. The needle bath is one of the most useful means of treatment as it can be regulated in temperature and duration with the utmost nicety.

It must always be remembered that as age advances the skin tends to become dry and inactive and the thermogenic power of the system impaired, especially in those predisposed to gout, granular kidney, glycosuria and neurasthenia. Such subjects required a thorough preliminary heating or even sweating followed by a short cool application (75° F. or lower for five to ten seconds).

Where there is any tendency to cardio-vascular change extremes of all kinds are to be especially avoided: "*In medio tutissimus ibis.*" A bath at 90° F. gradually reduced to 75° F. over a period of five minutes is a useful tentative proceeding. Definitely hot or cold immersion and plunge baths, or affusions, are quite contra-indicated as they are also where there is any tendency to emphysema or asthma. Cold baths of all kinds are inadmissible in cases of high blood-pressure or where there is any indication of renal inadequacy. In those cases in which there is any suspicion of local syncope any of the group of cold tonic measures should be handled most delicately as in my experience the reactive response is very difficult to obtain. Where there is any anæmia cold baths should be of very short duration and the patient should have been thoroughly warmed beforehand. In nervous persons it is well to begin with warm baths of gradually increasing temperature. Fleishy persons do not react quickly as a rule but they stand prolonged treatment better than their thinner brethren in consequence of their better heat-forming powers. Cold baths and brisk exercise are in such cases especially indicated. Phlegmatic subjects tolerate well the colder intensive forms of treatment such as douches under considerable pressure. Sedentary persons are benefited by sudorific measures as well as by cold tonic treatment. Frequent hot baths are to be avoided, especially in winter; but hot sponge baths are often to be preferred to cold in hot weather, as there is less subsequent heat production. The painful and stiff joints and impaired

mobility due to senile changes are much benefited by hot packs followed by hot douches or alternating hot and cold douches to the affected part.

Turkish and Russian baths, especially the latter, are generally unsuitable in advancing years, particularly for those unaccustomed to them, and all the advantages of this valuable form of thermal treatment can be equally well obtained by the use of hot air or vapour cabinet baths. Vapour baths are particularly suitable for rheumatic or gouty subjects but care must be taken to avoid over-heating. Hot air baths are preferable in cases of obesity. The terminal cooling process in these baths should be quite gradual and not sudden as is sometimes directed. Superior, however, to either vapour or hot air baths for the purpose before us is the electric light cabinet bath, with which the same results can be obtained at a much lower temperature. Kellogg, who has paid great attention to this subject, found that the CO_2 output was greater in the electric light bath than in either the vapour or hot air bath; that elimination was better, but that the urea output was less; also that sweating—which, as Bouchard has shown, begins when the body temperature is raised by 0.7°C ., was established much more quickly and with a lower bath temperature. These baths have a general tonic effect, provided tissue construction exceeds tissue destruction. They are highly efficient as an eliminative measure in gouty and rheumatic subjects and after prolonged residence in tropical climates. They are also extremely serviceable in stiffened joints and in the pains that so frequently occur in old injuries.

Sitz baths, in addition to their local effect upon the pelvic organs, are often useful as derivative measures. A hot sitz bath relieves palpitation and the headache due to fatigue and mental strain. The cold sitz bath tones up the vessels of the pelvic organs and the intestines, and stimulates the muscular fibres of the intestines and the bladder.

There remain for consideration baths at the so-called indifferent temperature, the neutral point of which is about 95°F . Here stimulation is almost in abeyance, and the cutaneous nerve-endings are protected from the irritation of their ordinary surroundings. Heymann suggests that the excitability of the end-organs is further reduced by the saturation of the epidermis, hence the soothing of cutaneous irritation, which is one of the effects of baths at this temperature. Reflex activity is suppressed, oxidation is at its minimum, muscular excitability and nervous irritability are lessened, the nervous system is soothed, and a general sense of tranquillity engendered. The respiration is unaffected, but the pulse is diminished in frequency, and the blood-pressure lowered, the terminal fall here being much prolonged. Neutral baths are especially important in senescence; they are useful in conditions of nervous irritability and insomnia provided that reaction be guarded against; and they are of signal service where there is a tendency to cardio-vascular changes associated with high blood-pressure. Kellogg, who has made a large number of clinical observations on this subject, particularly recommends: (1) Immersion baths, 98°F . to 92°F ., with friction, fifteen to forty minutes; (2) needle baths, 96°F . to 86°F ., one to three minutes; (3) prolonged neutral baths followed by very short cool ones.

In the majority of these cases the skin has lost its suppleness and freshness of colour. The cutaneous area contains less blood and perspiration is difficult. As the result of treatment the skin is improved in function, the peripheral circulation is enhanced, the viscosity of the blood is diminished, the blood-pressure is reduced, the heart is relieved and its work lessened.

The changes in senescence are inevitable: they are progressive, and I have

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22 BurrIDGE: *Possible Defect of Barium-containing Waters*

endeavoured to indicate in outline how balneotherapy can be adapted so as to retard their progress and counter their effects, as far as may be. By its judicious and carefully planned employment we can bring into play most of the important functions of the body. We can profoundly influence the circulatory, respiratory, alimentary, secretory, and excretory organs and the manifold energies of the nervous system, tranquillize unduly active mechanisms, stimulate the processes of nutrition and metabolism, and increase the natural defences of the system.

During considerable experience of balneotherapy I have necessarily been brought into contact with many cases well advanced in life, some of them quite old patients; and I have been repeatedly struck by the unusual vitality displayed by those who had always made it a practice to avail themselves regularly of a systematic course of treatment. Enthusiasts they may have been, but their enthusiasm appeared to me to have been amply justified. Their vigour and alertness both of body and mind have in many instances been remarkable. It may be said that they were endowed with an exceptionally fine constitution, or had come of a sound and long-lived stock, or had consistently walked in the way of physiological righteousness; but I have repeatedly satisfied myself that this was not always the case. But even allowing that they were of unusually good make-up and did not outrage the laws of nature, I have been forced to the conclusion that their habits so far as balneotherapy was concerned played no mean part in the maintenance of their high standard of health and in retarding the development of those inevitable changes which old age brings in its train; and it is the recollection of these vigorous valetudinarian veterans which has suggested to me the few remarks I have been privileged to put before you to-day.

Note on a Possible Defect of Barium-containing Waters.

By W. BURRIDGE, M.B.

As is well known, an excised heart can continue beating for some considerable time when it is perfused with Ringer's solution. The heart so perfused may be conveniently regarded as forming part of a mechanical system of which the working elements have been reduced to their lowest terms.

It is possible to regulate the height of the beat of the perfused heart by the simple device of varying the calcium content of the perfusing solution. The more the calcium added the greater the height of the beat, and vice versa. If, next, it be attempted to keep the heart beating at a constant level when it is exposed to the action of drugs, &c., that also is found possible by use of the device of varying the calcium. Substances which augment cardiac activity require calcium for the visible expression of their action, which is that of a lubrication of calcium. In a heart under their influence less calcium is required to make active a given proportion of the heart's stock of contractile material, or, expressed differently, a given amount of calcium can now make active a greater amount of contractile material. Opposite relations hold good for cardiac depressants.

¹ At a meeting of the Section, held December 9, 1920.

The normal lubrication of the cardiac machine appears to be effected by the ductless glands. Adrenal or pituitary extracts, for example, both increase the amount of contractile material which a given amount of calcium can activate. In cardiac failure, however, there seems to be some clogging influence at work hindering the normal functioning of calcium and incapable of rectification by the ductless glands. Digitalis may, however, rectify matters, though few would employ it until some unknown clogging influence arising from the intestinal tract had been first removed.

The beneficial action of digitalis on a cardiac contraction is, thus, exerted through calcium, and partakes of a lubrication of the latter. That lubrication gives us a sound reason for employing the drug.

Barium, however, exerts its particular effects in a quite different manner. When it is introduced into the cardiac system there follows a fight between it and calcium for the possession of that structure through which calcium exercises its normal effects. If barium acted more efficiently in the cardiac machine we should thus have good reason for replacing calcium by barium at a time when the calcium itself works under stress. But it is less efficient than calcium, so that its introduction into the cardiac system could only make bad matters worse.

Experiments were done on a heart, and the proportions between the amounts of barium and calcium used were approximately those existing in a well-known barium well. It was seen that immediately after the barium was introduced into the solution the heights of the contractions were slightly increased and that there was also an increase of tone. But it was also seen that the full effect of the barium was exerted almost immediately after it was introduced, and that thereafter its efficiency was diminished. Another important point is that all the increase of activity due to the barium disappeared immediately after the barium was removed. But even more important is the fact that the last state of the heart was worse than the first. Barium left the heart less capable of activity than it was before. That depression of activity after barium I find to be general. I have also found that digitalis is an effective antidote to the depression produced by barium.

The presence of barium in the waters of a well should not, then, be regarded as an indication for their use in cases of cardiac insufficiency. Whatever therapeutic action barium possesses can be performed more efficiently by digitalis, and there is that post-barium depression which is something not seen after digitalis.

On the Value of Combined Methods in Diagnosis.¹

By FRANCIS HERNAMAN-JOHNSON, M.D.

(ABSTRACT.)

PATIENTS are usually sent to spas bearing a certain diagnostic label; but a considerable proportion of original diagnoses, even when made by skilled men, ultimately prove to be wrong. All practitioners should be personally familiar with all the ordinary methods of clinical investigation; and should understand the possibilities of the more technical procedures. These

¹ At a meeting of the Section, held December 9, 1920.

include all the more elaborated chemical and instrumental methods, but this lecture deals chiefly with the use of X-rays, and shows their relationship to other weapons in the diagnostic armamentarium.

Cases of lung tuberculosis, labelled "anæmia" or "debility" are often sent to spas. Curiously, such cases are not as a rule really "early," for X-ray examination may show the middle portion of both lungs to be extensively fibrosed—this indicating old standing disease in a resistant subject. The X-ray shows us an end result—not necessarily an active disease process. Hence the findings in themselves may be far from conclusive: but, taken in conjunction with failing health and loss of weight, should be looked upon as highly significant.

So-called "asthmatics" may be suffering from enlarged, atonic heart, intrathoracic tumour, or aneurysm. In such cases, X-ray examination helps to correct the diagnosis.

Difficulty in swallowing is often put down to neurosis, and patients are recommended to seek change of scene and climate. In a certain proportion of such cases, pharyngeal pouches are present, and in a few, commencing cancerous stricture. X-ray examination by opaque bolus should never be omitted, but, in the event of a small pouch being found, it is generally better not to tell the patient, for experience proves that he may be troubled by it when he is "run down."

In joint troubles, X-rays are a useful aid, both in classification and in prognosis, but must not be relied on exclusively. If bony change could be totally excluded, it would be of great importance. Otherwise joint troubles can be roughly classified as hypertrophic and atrophic. Atrophic forms somewhat resemble the progressive diseases of the cord, and are very intractable. It is usually very difficult to find any septic cause for them.

In the search for septic foci, we are helped by X-ray examination of the teeth, the frontal sinus and maxillary antra, and the appendix. In the case of the antra, opacity may be caused by inspissated mucus, as well as by pus, and therefore X-ray findings must be supported by clinical evidence before action can be taken. In the case of root abscess, however, the X-ray appearances are practically pathognomonic.

Diseases of the liver and of the gall-bladder are not readily investigated by X-rays, except by special methods. Gall-stones may be seen in about 15 per cent. of all cases. By the recently introduced method of inflation of the peritoneal cavity with oxygen, the liver, may, however, be clearly outlined, so that tumours on its upper surface become visible, and an enlarged gall-bladder can be made to stand out clearly against the surrounding gas. In skilled hands this procedure appears to be practically without risk. Its findings must be very carefully correlated with those of well-established methods before final reliance can be placed upon them.

The opaque meal and the opaque enema are still the chief aids in the investigation both of functional and organic trouble in the stomach and bowels. Some have scoffed at the results obtained in the investigation of gastric and intestinal motility on the ground that the opaque meal is unnatural, and that there is so much variation in its make-up and in the technique of various investigators. Provided, however, that the examiner has wide experience, and that he always himself uses the same procedure, he soon becomes competent to recognize deviations from the normal, and to assess them at their proper value in conjunction with clinical signs and symptoms. It is scarcely realized as it should be that spasm of unstriated muscle is the immediate cause of most

abdominal pain, whether there be a definite history of organic cause, or not. The clinical picture of malignant obstruction of the colon may be very closely mimicked by a persistent spasm, and even the opaque meal may lend support to such a grave diagnosis. The opaque enema given after the administration of belladonna for twenty-four hours, will, however, practically overcome any spasm, and demonstrate the presence of a normal lumen. The demonstration of the spasm and of its exact site is, however, of as much clinical value as that of organic disease; for, if measures be taken to relieve the spasm, a hitherto almost unbearable existence may be made a tolerable, or even a pleasant one.

Cases arise in which the most careful X-ray examination will still leave it doubtful whether an obstruction is organic or functional. In such, it is possible to reach even a provisional diagnosis only by a careful review of the history and clinical findings. Duration of the trouble and the patient's weight are two very important points. When the history extends to years, and the weight is not diminishing, only the most unequivocal evidence of organic obstruction should be accepted.

Ulcers which have slowly penetrated so as to form definite cavities, and new growths which encroach upon the lumen of the bowel, give very definite X-ray signs.

Malignancy *per se* cannot be diagnosed by X-rays alone. The drafting of an intelligent report therefore, demands wide clinical knowledge. It should consist of a statement of the actual X-ray findings, which are, of course, in the nature of physical signs; a discussion of these signs in relation to what is known about the case in general; and finally, an opinion as to the diagnosis, based upon all the facts known to the radiologist. Unless this is done, the whole investigation is barren, and might just as well have been made by a lay operator.

This opinion should be communicated only to the medical man directly responsible for the patient's welfare. Some fact may be known to him which renders the diagnosis improbable or invalid. In such a case, a consultation is highly desirable between the practitioner and the X-ray expert; indeed, this should be aimed at whenever possible. It cannot be too strongly insisted on that the X-ray tube is merely a diagnostic instrument on a par with the ophthalmoscope or sigmoidoscope, and is only valuable in direct proportion to the skill, experience and judgment of the man who employs it. In diagnosis, as in treatment, judicious combination of methods is the keynote of success.

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Section for the Study of Disease in Children.

President—Dr. FREDERICK LANGMEAD.

Case of Severe Anæmia.¹

By H. CHODAK GREGORY, M.D.

THE case is that of a female child, aged 1 year 5 months, who first came under observation nearly two months ago, having become pale, lost appetite and been drowsy during a month before admission. Vomiting had occurred once or twice, the stools were pale in colour and offensive; there had been no hæmorrhages. She was breast-fed for three months, then fed on Nestlé's milk. No tuberculosis in the family and nothing to suggest syphilis; seven other healthy children.

The child was well-grown and well-nourished. Anæmia was marked, the skin being of a greenish-yellow colour; there was no true jaundice and no petechiæ were present. The spleen was greatly enlarged, the lower pole reaching down to the level of the umbilicus, the anterior border to half-way between the umbilicus and costal margin. The liver was also enlarged, the lower border being felt two finger-breadths below the costal margin in the nipple line. There was no evidence of lymphatic glandular enlargement except for a few small cervical glands which could easily be accounted for by pediculi and a dirty scalp. The heart and lungs were normal. The urine was pale, acid, contained no albumin nor sugar and no urobilin; it was sterile on culture. Stools pale, otherwise normal; no occult blood, no ova.

The blood count on admission showed: Hæmoglobin, 10 per cent.; red cells, 3,250,000; colour index, 0.16; white cells, 1,880; polymorphonuclears, 36.5 per cent.; small lymphocytes, 53 per cent.; large lymphocytes, 5.5 per cent.; large hyalines, 2.75 per cent.; eosinophils,

¹ At a meeting of the Section, held October 22, 1920.

1.75 per cent.; mast cells, 0.5 per cent. Six normoblasts were seen while counting 400 white cells. The fragility of the corpuscles was found to be equal to normal blood. Temperature, 100°F. Wassermann reaction negative.

Three days later the blood count showed a decrease of reds to 2,400,000, a slight increase of whites to 2,380, the proportion of whites remaining much the same, but with the addition of 5 per cent. myelocytes; only one normoblast was seen in this count.

The general condition became steadily worse, the temperature was raised every night and the pulse was rapid and weak; there was considerable dilatation of the right side of the heart and pulsation of neck veins.

On the eighth night after admission the child collapsed suddenly and seemed to be dying, so, without waiting for any special examination of the mother's blood, a transfusion was done immediately: 20 c.c. of blood in 10 per cent. sodium citrate were injected into the child's left external jugular vein. The patient improved a little during the night, and four days later another transfusion, this time of 10 c.c. of blood, was made, a light ether anæsthesia being used on this occasion to avoid the fright and struggling.

From that time improvement has been steady. The colour is healthier, and the general condition progressively better (the appetite never failed even at the worst time). The spleen and liver are perhaps slightly diminished in size, but there is no great alteration.

The blood picture seven weeks after admission shows: Hæmoglobin, 30 per cent.; red cells, 4,500,000; white cells, 14,500; polymorphonuclears, 41 per cent.; small lymphocytes, 34 per cent.; large lymphocytes, 12 per cent.; large hyalines, 7 per cent.; myelocytes, 5 per cent.; eosinophils, 0. No nucleated red cells seen.

Apart from the transfusions, treatment has been limited to small doses of iron and arsenic and some camphor injections when a stimulant was needed.

I think the result was due to the transfused blood having stimulated the bone marrow. The child is Jewish, and this condition often occurs in Jews.

The case in many particulars resembles the type of splenic anæmia described by von Jaksch, but one hesitates to name it definitely as such, particularly as the descriptions of splenic anæmia infantum given by various authorities differ so widely one from another. The marked enlargement of the liver, the leucopenia in the early stages and the

absence of megaloblasts, might all be points against the diagnosis. Whatever name may be given to the disease there is no doubt that it was a condition of profound toxæmia, to which there was at first very little reaction as evidenced by the very low white count, 1,800, the absence of myelocytes in the first count, and the comparatively small number of nucleated red cells: the picture, in fact, of an aplastic anæmia. Whether the ultimate reaction was a spontaneous effort of the child's bone-marrow or was produced by some stimulating effect of the mother's blood it is, of course, impossible to say. The actual amount of mother's blood transfused was so small that it could have had very little direct effect on the blood stream.

Other possible diagnoses which occurred to me during the early stage were:—

(1) The pre-jaundice stage of acholuric family jaundice, in which marked anæmia, enlargement of spleen and liver, are the principal symptoms. There was, however, no increased fragility of corpuscles, and no urobilin in the urine.

(2) A splenic anæmia approaching more to Banti's type: This was suggested by the leucopenia, the large liver, &c. I believe, however, that these cases do not occur in infants, and are, in any case, never so rapid in onset.

DISCUSSION.

Dr. THURSFIELD considered that the case was a good example of von Jaksch's anæmia pseudo-leukæmica infantum, in spite of certain details in the blood examinations which were uncommon in that disease.

Dr. H. C. CAMERON said that the point which had interested him in these cases was the attempt to discover how far a dietetic cause was at work in the production of the anæmia. A striking feature of the cases was the age-incidence. It was an anæmia of the second half of infancy, developing at a time when the depot of iron with which the child was born was exhausted. The severity and frequency of anæmia at this age contrasted with the comparative rarity of anæmia in early infancy. The most severe cases seemed to be in series with the cases which were less severe, all occurring at about the same age. He did not know whether the explanation in some cases, at least, was a dietetic one. The diet in this case had not been fully recorded, but at 15 months it consisted of Nestlé's milk. Meat, green vegetables, fruits appeared to form no part. Was it the absence of iron from such sources as these which induced, under certain circumstances, this severe anæmia? He had treated several well-marked cases of von Jaksch's disease by giving meat and green vegetables freely and had met with very rapid improvement. Once a mixed

dietary was well established there was no tendency to relapse. This seemed to suggest that the dietetic factor was important in these cases. It was obvious that disturbances of bone marrow were occasioned with much greater ease in infancy than in later life. These children might show little sign of ill-health. They might be bright and happy; yet they carried in their blood cells that which would be of very grave prognosis in adult life. It was clear that comparatively trivial causes could cause striking alterations in the blood picture at that age.

Dr. ERIC PRITCHARD said that some time ago Dr. Parkinson had shown some cases of aplastic anæmia in children who had had scarlet fever. He (Dr. Pritchard) had also had a similar case in the wards at the time in which the reds were well below a million—700,000, in fact—the hæmoglobin was only 18 per cent., and the white cells were down to 2,000 or 3,000. He had not expected very much improvement in the case by the hypodermic injection of collosol iron, which he had found so useful in cases of secondary anæmia. He had tried it, however, and with a startling result, for the red count had gone up to over two millions within three days, suggesting that the red marrow had not been at fault. He advised members of this Section who had not tried it to give this method a trial in their cases of anæmia.

Transposition of Viscera with Congenital Heart Disease.

By BERNARD MYERS, C.M.G., M.D.

THE patient, H. P., aged 1 year 2 months was brought to the out-patient department, Royal Waterloo Hospital, on July 30, 1920. The mother complained that the child had been "blue since birth," and was short of breath. He had previously attended the Royal National Orthopædic Hospital, Great Portland Street, for double talipes equinovarus.

The mother stated that she suffered severely from influenza while she was pregnant. She had previously suffered from gastric ulcer "on and off" since 1907 and had one attack of hæmatemesis. There is no known case of heart trouble in the family and no other child with "blue lips." She has three children: a girl, aged $7\frac{1}{2}$ years; a boy, aged 5 years; and the patient, H., aged at present 1 year 3 months. The other two are perfectly healthy. There was no difficulty at patient's birth and instruments were not used. The mother noticed nothing special about him until he was 5 days old, when he was observed to go very blue and was stated to have been unconscious for two days. Brandy was given to him. He was first fed on Glaxo, afterwards on cow's milk

and baked flour. The mother says he has much improved in colour and health generally during the last year and that his breathing is easier.

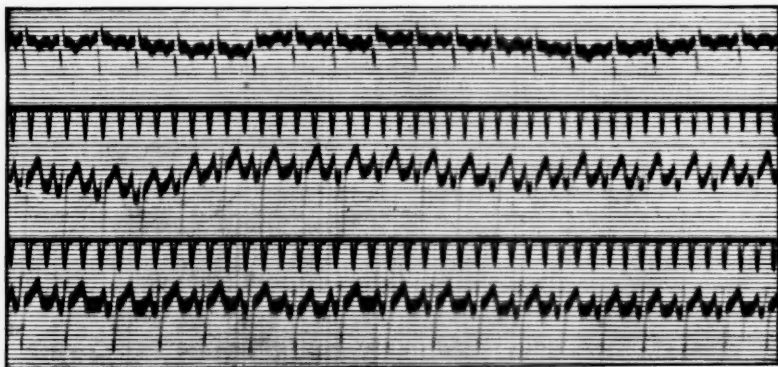
Upon examination the child was found to be fairly well developed. (The weight at present is only 16 lb. and height $27\frac{1}{2}$ in. Six teeth were present on admission; there are now eight.) The legs are rather thin, due probably in part to the application of plaster. The skin of the face, ears and neck was a little dusky and the lips moderately cyanosed, a condition also observed in the mouth and tongue. He did not seem to be at all distressed in breathing. The respirations were 35, and the pulse between 140 and 150. Mentally he was alert and apparently normal. This agrees with his mother's statement. No œdema was observed, nor any dilated veins. There was slight clubbing of fingers, the bluish colour being especially marked around the nails. No hare lip, cleft palate or spina bifida. Fontanelle about normal for age. The child was stated to eat and sleep well.

A slight pulsation was visible to the eye in the second, third and fourth right spaces. This extended from the right sternal margin outwards for 2 to 3 in. A systolic thrill could be felt over these spaces, more especially in the third. What appeared to be the apex beat was felt in the fourth space in right nipple line. Dullness was made out in second, third and fourth spaces to right of sternum towards the third and fourth spaces in right nipple line. The heart sounds were audible on the right side at areas corresponding to the usual ones on left side of chest, but there was also present a systolic murmur at the junction of the second right cartilage with the sternum which was also heard slightly for a short distance to the left of the sternum. The second sound was normal. A louder and harsher systolic murmur was detected over the third right cartilage about $\frac{1}{2}$ to 1 in. to right of sternum. This murmur seemed to be propagated in all directions and was not only heard over the whole precordial region but also over most of the right side of the chest and in parts of the left. It seemed at first as if there were a third murmur best heard over the apex beat and propagated to the right axilla and inferior angle of scapula, but I believe now that it is the same murmur heard loudest over the third right cartilage. The liver was found on the left side and the spleen on the right, both occupying corresponding positions on the opposite sides to normal.

The child was admitted on the same day as an in-patient under Dr. C. O. Hawthorne as a case of transposition of viscera with congenital heart disease, probably pulmonary stenosis and patent interventricular septum. Dr. Hawthorne agreed with the diagnosis. Dr. Leatham

reported the blood count to be: Red blood corpuscles, 10,400,000 per cubic millimetre; hæmoglobin, 130 per cent.; (the colour index equals about 62 per cent.); leucocytes, 7,600 per cubic millimetre. Differential count: Polymorphs, 44·4 per cent.; lymphocytes, 45·0 per cent.; large mononuclears, 7·2 per cent.; transitionals, 2·4 per cent.; eosinophils, 1 per cent. The Wassermann reaction was negative.

Dr. Martin Berry made an X-ray examination and found that: "So far as can be determined radiographically the viscera are completely transposed. The apex beat of the heart is on the right side and the general shape of the heart just that of a normal heart transposed. The aorta was clearly seen pulsating on the right side. The diaphragm is of approximately equal level on the two sides, but is rather flatter on



the left than on the right; respiratory excursion on the two sides is equal. A partially opaque meal was given and it is seen that the stomach is transposed, the fundus lying high under the curve of the right diaphragm whilst the large opaque area of the liver is clearly seen on the left side. On the screen I thought I saw the spleen on the right side. An opaque enema shows the sigmoid on the right side. Most of the colon is outlined by flatus and it is seen that the flexure on the right side is considerably higher than that on the left, an exact reversal of the normal relations. The kidneys were not seen on the screen."

At the National Hospital for Diseases of the Heart an electrocardiogram was kindly made, and Lead 1 apparently agrees with the condition spoken of by Dr. Lewis on page 57 in his book "The Mechanism and Graphic Registration of the Heart Beat."

The child seems to have improved a little in general health since admission to the wards, and is stated to be quite bright. The temperature varies between 97° to 98.4° F. He takes his food well and gives the nurses no trouble. However, when he cries the duskiness of the face and cyanosis of the lips are distinctly increased.

DISCUSSION.

The PRESIDENT said that there was always an element of uncertainty in a case of congenital heart disease, as to the lesion which was present. The decision was particularly difficult in this case, because everything was on the reverse side to the normal. There was always the difficulty that the lesion which mattered often produced no murmur, whilst one which was unimportant or compensatory caused the noise. A patency of the interventricular septum often caused a murmur which was loudest in the fourth and fifth spaces near the sternum rather than in the third, and he was suspicious that the murmur in this case was that of pulmonary stenosis. He agreed that both were probably present.

Dr. H. C. CAMERON did not know whether members had read an interesting paper on transposition of viscera founded on experience gained, he thought, during the examination of recruits. It was emphasized that where the transposition was complete, as it was in this case, the man was capable of the normal amount of exertion without distress; but when the transposition was only partial, especially when the abdominal viscera did not participate, in nearly every case small exertion caused distress. Cases of complete transposition had been accepted at ordinary rates by life assurance companies. He took it, therefore, that the transposition in this patient did not add to the gravity of the prognosis.

Congenital Deficiency of the Subcutaneous Fibrous Tissue associated with Nodules due to Dilated Arterioles.

By F. J. POYNTON, M.D., and DONALD PATERSON, M.B.

J. S. K., a MALE, aged 5 years. Admitted to the Hospital for Sick Children, Great Ormond Street, on October 7, 1920. The complaint was that since birth the patient's skin had appeared too large for his body.

Family history: An only child; no history of abnormalities present.

Previous health: Always good; the whole interest of the case centres round the skin condition.

8 Poynton and Paterson: *Deficiency of Fibrous Tissue*

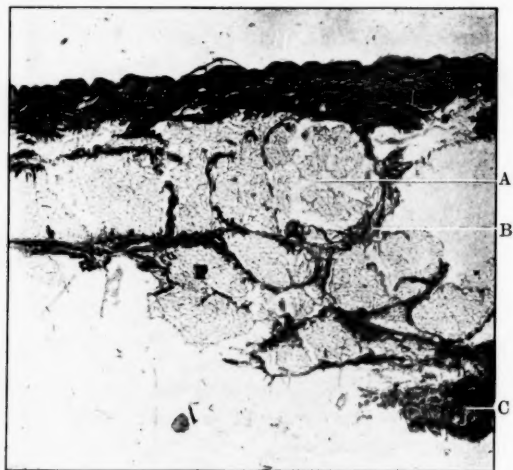


FIG. 1.

Section of normal skin and subcutaneous tissue.

Note.—A, adipose tissue ; B, fibrous trabeculae mooring down the skin to C, muscles.

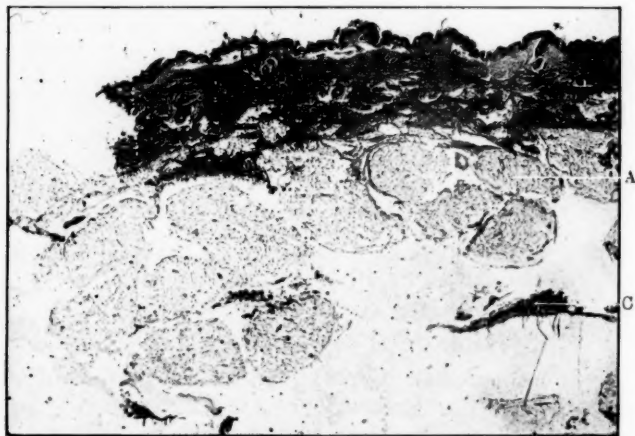


FIG. 2.

Section of patient's skin taken from the same site as the normal section (see fig. 1).

Note.—A, adipose tissue ; fibrous tissue (fig. 1, B) seems entirely absent and the skin is thus unmoored ; C, muscles.

History of present complaint: His parents had noticed that his skin was lax and cut very easily, and that he bruised freely when he fell.

On admission: Except for this skin abnormality he was in every way healthy and normal in intelligence and size. The impression obtained on picking up the skin was that it was very loosely attached to the underlying fascia. On the lower limbs there were large scars, thin, soft and redundant, and apparently lacking in cicatricial elements. The laxity of the skin was not uniform but most conspicuous over the extremities, least over the face and trunk. The hands and feet had a



FIG. 3.

Section through miliary aneurysm.

Note.—A, the aneurysmal dilatation of this small vessel; B, places where the supporting tissues seem deficient; C, the marked folds into which the lining membrane has been thrown.

peculiar pad-like feel. There was nothing peculiar about the nails. The forearms and legs were more affected than the arms and thighs. Small subcutaneous millet-seed nodules were felt along the shins and extensor surface of the ulnæ. These nodules were movable and not tender and about six of them were detected. A nodule was removed from the forearm with skin and subcutaneous tissue.

DISCUSSION.

Dr. F. PARKES WEBER said that in this child there were a number of very small nodules to be felt in certain parts of the subcutaneous tissue, and thought that they were fibrous with a calcium carbonate deposit in the meshes.¹ Children who had these chalky nodules were apt to show reticular cyanosis of the skin ("livedo reticulata"). A very careful examination of this child by skiagraphy might prove that the nodules in question contained calcium carbonate. [Dr. THURSFIELD asked Dr. Weber where the carbonate of calcium came from in this case.] Dr. Weber replied to that by asking another question, namely, where the sodium urate in gouty tophi came from, and where the calcium carbonate came from in calcareous atheromatous arteries. Probably the source was the same—from the blood and tissue lymph.

Dr. COCKAYNE said that the skin in this case did not seem to be elastic. He did not think the case had any relationship to "elastic skin"—in which the microscopical appearance described was a myxomatous condition of the skin. That did not appear to be so in Dr. Paterson's case.

Dr. THURSFIELD suggested that the patient was merely an example of hypotonia such as most men were familiar with in some of their school-fellows who were regarded as "freaks."

Postscript.—A section was made of the skin and subcutaneous tissue and compared with the normal skin of a child taken post mortem from the identical site. On comparison (vide figs. 1-3, pp. 8, 9) it is apparent that there is in this case an almost entire absence of the fibrous trabeculae which bind the true skin to the underlying tissues. Sections through the nodule removed showed it to be an aneurysmal condition situated on a small arteriole, the surrounding supporting connective tissue apparently being deficient at this point. No evidence of inflammatory changes either of an endarteritis or peri-arteritis could be made out. The nodules were found over areas exposed to injury and probably owe their origin to this cause; the free bruising of the skin may also be explained by the imperfect protection of the subcutaneous vascular system.

¹ Cf. F. P. Weber, "Multiple Calcification in the Subcutaneous Tissue," *Brit. Journ. Child. Dis.*, Lond., 1913, x, p. 97.

Cataracts in a Mongolian Idiot.

By H. ROWE JEREMY, F.R.C.S.

THE baby, I. M., was admitted on March 20, into the London Hospital, when 3 weeks old, with the history that the nurse had noticed the pupils of the eyes were white a week after birth. The mother is a poorly nourished Jewess and has had four previous children, who were healthy and had no eye trouble. The child is a boy, and a Mongol in appearance. The eyes are small, and have a coarse lateral nystagmus. The corneæ are of normal size in ratio to the size of the eye, and are clear of opacities. The irides show no signs of inflammation, and there are no posterior synechiæ. The pupils are regular and equal, and react to light. Both lenses are totally opaque. The cataracts do not resemble any of the usual types of congenital cataracts. They are densely opaque, and more opaque in the centre than the periphery. The central opacities are studded with irregular projections of a whiter hue. There is no red reflex by transmitted light, and the fundus oculi cannot be seen.

The case is of interest in view of its ætiology.

Ormond [1], in 1911, reported lens opacities in 50 per cent. of Mongolian idiots at Earlswood and Darenth. Stoelzner [2] has recently stated that Mongolism in the child is due to hypothyroidism in the mother and child. In hypothyroidism, epiblastic structures, such as the epidermis, hair and nails, are particularly prone to suffer from lack of nutrition; and, as the lens is of epiblastic origin, it is reasonable to expect that it will suffer in the same way. I have records of two cases of cataracts in cretins, one starting at the age of 30 years, and I believe that hypothyroidism is one of the causes of cataracts. Further proof that cataracts are caused by insufficiency of thyroid is given by Edmunds [3], who reported to this Society: "Double Cataracts following Experimental Thyroidectomy in a Dog" in 1916. Schiller [4], in 1899, recorded a case in which cataracts occurred six months after thyroidectomy by Czerny; and Westphal [5] also recorded double cataracts following thyroidectomy in 1901.

Last year [6] I reported a case of double cataracts following partial thyroidectomy for carcinoma of the thyroid in a woman aged 50 years.

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Fracture of the Pelvis with Dislocation.

By B. WHITCHURCH HOWELL, F.R.C.S.

HISTORY: On May 28, 1920, L. T., aged 7 years, whilst running across the road, was knocked down flat on his back by a motor car. The exact history is uncertain. He was rendered unconscious and was taken at once to one of the London infirmaries, where he remained three weeks. His mother says he was treated by means of adhesive plaster. The medical superintendent tells me his condition was one of extensive bruising to the back, without any physical signs. There was no evidence of fracture of any bone or of cord injury. He had no hæmorrhage, no signs of fractured pelvis, no fracture of limb, nor injury to spleen. His parents state that when taken home he could not walk alone, but had to hold on to the table to stand, and dragged his legs, the right worse than the left.

Present condition: On July 7, 1920, he was brought to me at the Queen's Hospital, Hackney Road, on account of weakness of the legs. There was a triangular flattening over the sacral area, with signs of old bruising and a network of veins. This area was definitely tender. There was also some tenderness over the pubes. He had some lordosis and his abdomen was slightly distended and protuberant. The movements of his spine were good, and there was nothing peculiar about his gait. Femoral pulses equal. Knee-jerks +, L. > R. On rectal examination (incomplete) a thickening of the os pubis was noticed.

The X-ray plates, taken by Dr. Williams, show a fracture of the ilium in the region of the sacro-iliac joint, with downward dislocation of the sacrum, together with a fracture of the pubes near the symphysis. The lumbar spine was normal.

The boy is shown as a case of extensive injury to the pelvis, with apparently very few symptoms: (1) No urinary disturbance; (2) no injury to the sacral plexus of nerves; (3) only slight deformity.

Overgrowth of Hair on Part of the Scalp.

By FREDERICK LANGMEAD, M.D.

E. D., MALE, aged 6 months. The infant was first brought to hospital when aged 9 weeks, for the abnormal growth of scalp hair. He is in good health and otherwise normal. Over the occipital and right parietal regions is a mat of long dark silky hair, while the remainder of the scalp is covered by down of normal appearance and length. The normal hair is growing slowly. No treatment is being adopted. For cosmetic reasons much depends upon the colour which the normal hair is going to assume. The patient being a boy there should be no difficulty in rendering the abnormality inconspicuous.

DISCUSSION.

Dr. THURSFIELD thought this condition closely allied to "hairy mole."

Dr. F. PARKES WEBER said that this was a hairy nævus. He asked whether any member had previously seen a hairy nævus of the scalp which was so nearly bounded by the normal limits of the scalp hair?

Defective Development of certain Neck Muscles.

By FREDERICK LANGMEAD, M.D.

L. P., A FEMALE infant, aged 1 year 5 months. The patient was brought to hospital because she "cannot sit up straight; the head falls forward, the neck does not fill out, and she is unable to stand." Examination reveals that though she can sit up for a very short period, her most comfortable attitude is a semi-reclining one, by which means the head can be kept vertical. The neck has a very scraggy appearance, owing to imperfect development of certain muscles. Of these the sternomastoids are conspicuously rudimentary, while the upper part of the trapezii are small. The short occipital-vertebral muscles appear to be normal. The cervical vertebræ are unduly conspicuous, while the scapulæ are somewhat small. The condition has been present from birth and is unaccompanied by symptoms other than those of muscular inefficiency. There is a degree of general muscular hypotonia.

Dr. THURSFIELD had not seen anything like it, and suggested that as there was some muscle power left, physical exercises, specially adapted, might prove of great benefit.

Cirrhosis of Liver.

By FREDERICK LANGMEAD, M.D.

R. M., A GIRL, an only child, aged $5\frac{1}{2}$ years. The child was quite well until $1\frac{1}{2}$ years of age, when "marks" appeared on her face after a heavy fall. Immediately after the fall a bruise appeared on the forehead; this disappeared but the dilated blood-vessels remained. Thereafter the condition spread over the face, and about last March appeared on the arms. Epistaxis occurred on four or five occasions during the summer of 1919, especially after exposure to the sun. Abdominal distension, varying in degree, was first noticed during last spring, and was sometimes accompanied by diarrhoea, the motions being very dark, and containing mucus.

When admitted to hospital on May 7, 1920, the patient was seen to be plump, and appeared to be quite comfortable and free from symptoms. Over the face, and to a less extent over the forearms, there were numerous small dilated blood-vessels. The liver was enlarged, reaching about 1 in. below the costal margin, and was easily felt, its edge being hard and indiarubber-like in consistence; the left lobe appeared to be more affected than the right. The spleen extended for about $2\frac{1}{2}$ in. below the costal margin, and was firm and retained its normal shape. No ascites was present. There was no enlargement of lymphatic glands. The cardiac physical signs were normal, except for faint systolic bruits at the apex and base. Urine normal. A blood count made was as follows: Red blood cells, 4,800,000; white blood cells, 7,200; hæmoglobin, 65 per cent.; colour index, 0.7; polymorphs, 56 per cent.; small lymphocytes, 11 per cent.; large lymphocytes, 26 per cent.; large mononuclears, 1 per cent.; eosinophils, 4 per cent.; basophils, 1 per cent.; transitionals, 1 per cent. No abnormal cells.

The Wassermann reaction was negative on two occasions, and after the use of a provocative dose of arsenobenzol. No history of alcohol.

During her stay in the hospital for one month, a slight jaundice developed, but she remained otherwise free from symptoms. Recently she has had whooping-cough severely, during the course of which both hæmatemesis and melæna developed.

Dr. F. PARKES WEBER said he did not see the case, but the presence of decided cutaneous telangiectases, and the history of epistaxis, hæmatemesis and temporary slight jaundice, with enlargement of liver and spleen, afforded almost conclusive evidence of the presence of cirrhosis of the liver. The prognosis of these cases at any early age was, he believed, very bad; death might occur later on from hæmatemesis or from some intercurrent disease.

Rhythmical Involuntary Movements.

By FREDERICK LANGMEAD, M.D.

J. R., MALE, aged 2 years 8 months, was admitted into hospital in February last for inability to sit up, stand, or talk, and because he could not keep still. He is the only child of healthy parents, and was born at full term by an easy labour. The mother had no accidents nor illnesses during the pregnancy. At birth he appeared to be healthy and weighed 7 lb. With natural feeding he thrived and put on weight. The first tooth appeared at the age of one month. When between 2 and 3 months old he was suspected as being abnormal by his mother because he was very quiet and inactive and for six months he lay "like a doll" in bed or in his mother's arms. Though conscious he moved neither his legs nor his arms, neither cried nor smiled and took no interest in his surroundings.

When about 6 months old he began to use the right arm, moving it in a jerky way, and also to move his legs. At this age, too, he began to take some notice and to cry. From that time there had been a gradual increase in movements of the limbs, those on the right side being moved more than those on the left. He had never been able to hold his head up, to sit up or stand, and had never learnt to talk. When 15 months old he had an acute illness, diagnosed as pneumonia, which continued for six weeks and was followed by a good recovery. Since this illness the restless jerky movements of the limbs had been more obvious. Up to his admission he had had no convulsions nor periods of unconsciousness or drowsiness.

On admission he was found to be practically normal in physical development, he ate and slept well, and appeared to be in no pain or discomfort. It was clear, however, that his intellectual functions had not developed. Though bright in appearance, he failed to understand the simplest word. He cried with painful stimuli, or if hungry or interrupted during a meal, but expressed no other emotions, and made

no attempt to speak. There was no cranial nerve paralysis. Motor power was weak, for he could neither sit, stand nor crawl, and if placed on his belly could not roll over. There was no marked hypotonia, nor wasting; there were no contractures, nor rigidity. The most striking feature was constant involuntary movements of the limbs, rapid, purposeless and jerky in character, and somewhat resembling those of chorea. The sudden interposition of shock-like movements afforded, however, a distinction. There was also constant grimacing and twitching of the mouth. All the limbs moved wildly, the body continually wriggled and squirmed and the head moved restlessly. (When I first saw the child his mother had the greatest difficulty in preventing him from falling off her lap, and caught him on his way to the ground on several occasions.)

Reflexes.—The knee-jerks were very active, also the tendo Achillis jerk and the tendon reflexes of the arms. The plantar response was flexor on both sides and the abdominal reflex normal.

There were no changes in the fundi except paleness of the retinae. Apart from the neuro-muscular system there were no abnormalities. The cerebro-spinal fluid was normal, and the Wassermann reaction both of cerebro-spinal fluid and blood was negative.

Since he was discharged at the end of March he has been kept under observation in the out-patient department and it has been seen that the movements vary considerably in their activity from time to time. There have been attacks of rigidity on the right side, accompanied by pallor on the same side, according to the mother. During these seizures the right leg is drawn up. The movements are controlled to some extent by chloral and bromide.

I am indebted to Dr. F. J. Poynton, under whose care the child was while in hospital, for permitting me to use the in-patient notes of the case.

DISCUSSION.

Dr. THURSFIELD thought that the symptoms represented most probably a vascular lesion in the corpora striata, not an embryological malformation.

Dr. LANGMEAD (President), in reply, said he was very glad to have had Dr. Thursfield's opinion. He agreed with Dr. Thursfield that the majority of these cases were due to acquired lesions, and not to actual agenesis.

Section for the Study of Disease in Children.

President—Dr. FREDERICK LANGMEAD.

Case for Diagnosis.¹

By E. A. COCKAYNE, M.D.

E. B., BOY, aged 5 years. Weighed $3\frac{1}{2}$ lb. at birth and was a very weakly infant. Did not walk until nearly 3 years old, and first tooth did not appear until he was more than 3 years. He is an only child. The mother is delicate but has normal teeth. One of her sisters is stated never to have had more than two teeth on each side of the lower jaw. The upper teeth were normal in number and appearance. Another sister is said to have had teeth shaped like those of the patient and deficient in number. Her hair is long but thin. The boy is 37 in. in height and weighs 29 lb. He has a sallow complexion. The skin is soft in texture and there are wrinkles on the upper eyelids and below the lower. The hair is very thin and dry and has only been cut twice, the eyebrows and eyelashes are very thin and short. In the upper jaw there are two canine teeth and two incisors, all peg-shaped, and one molar with very sharp cusps; in the lower jaw there are only two canines, also peg-shaped. The urine and stools are normal. Wassermann reaction negative.

He appears to be quite intelligent and plays with other boys.

DISCUSSION.

Dr. E. CAUTLEY thought the case one of mere backward development. There might be some endocrine defect, secondary to the malnutrition.

Dr. H. C. CAMERON said the history emphasized how ill the child had been as a tiny baby, and how rapidly it had improved since. The nutritional

¹ At a meeting of the Section, held November 26, 1920.

damage probably took place quite early in life, and the late effects were now being witnessed, rather than any condition now progressive.

Dr. COCKAYNE said he thought the history of malnutrition in early life insufficient to explain the present condition of the boy's skin, hair and teeth.

Two Cases of Diabetes Mellitus of an Unusual Type.

By GEORGE GRAHAM, M.D.

CASE I.

E. B., FEMALE, aged 11 years.

History of present illness: In January, 1916, began to be thirsty and to lose weight; pruritus vulvæ gradually developed. In May, 1916, glycosuria was detected by Dr. Clive Riviere, and she has been in the East London Hospital for Children or its convalescent home ever since. The sugar excreted on admission was about 90 gm. per day. It disappeared after two starvation days and her sugar tolerance seemed to be about 50 gm. During the next three years treatment was always complicated by her skill in obtaining carbohydrate food from the other children. Height on admission not known; weight was 2 st. 3 lb. June, 1918: Weight, 2 st. 10 lb. July, 1919: Weight, 2 st. 12 lb. (19 lb. below Galton's average); height, 43½ in. (6½ in. below Galton's average). January, 1920: Weight, 2 st. 11½ lb. (22 lb. below Galton's average); height 44½ in. (6½ in. below Galton's average). October, 1920: Height, 47 in.; weight, 3 st. 3 lb.

January, 1920: She was a well proportioned child. Colour of skin a peculiar yellow varying in intensity. Pituitary fossa 8 mm. long and 6 mm. deep. Long bones showed transverse striation at ends.

The effect of a dose of 15 gm. of sugar was tested in January, 1920. The fasting value was 0.16 gm. per cent. and at the end of one hour it was 0.29 gm.; after two hours, 0.25 gm.; after three hours, 0.225 gm. A trace of sugar was passed in the first two hours and none in the third hour.

October, 1920: She has been very well, and very rarely passes sugar, as a starvation day follows automatically each time she steals bread. Her sugar tolerance is about 70 gm. on a diet containing 68 gm. of fat, 38 gm. of protein, 70 gm. of sugar, and 1,100 calories. She has to have a starvation every twenty-six days.

I have to thank Dr. Clive Riviere for permission to show this case.

CASE II.

E. L., FEMALE, aged 9 years.

History of present illness: Began to be thirsty in October, 1918, and developed pruritus vulvæ. Sugar was discovered and she was admitted to the Queen's Hospital for Children, and treated as in- and out-patient until September, 1919, when she was admitted as in-patient to St. Bartholomew's Hospital, remaining in hospital for nine months. The total sugar output was about 60 gm. per day. She has been treated with periods of starvation and egg and vegetable days but is exceedingly difficult to keep sugar-free; three eggs, 300 gm. of green vegetables and 25 gm. of butter—that is 35 gm. of fat, 5 gm. of protein, 12 gm. of sugar and 400 calories—being all that she can eat without passing sugar. She is small and well proportioned, with a peculiar yellow tinge of the skin which varies from time to time.

October, 1919: Height, 38½ in. (7 in. below Galton's average); weight, 30 lb. (20 lb. below Galton's average). She has not grown during the last year and is of the same weight. Pituitary fossa is 8½ mm. long and 7 mm. in depth. Long bones with transverse striation at lower ends.

The sugar tolerance—10 gm. of sugar, on July 13, 1920. Fasting value of blood-sugar 0.13; after one hour 0.25, and after two hours 0.3. Amount of sugar excreted very small: 0.1 gm. in first hour, 0.15 gm. in second hour, and 0.2 gm. in third hour.

She has now been out of hospital three months and does not appear much worse, but she usually passes sugar. She has a starvation day each week.

I have to thank Sir Archibald Garrod for permission to show this case.

DISCUSSION.

Dr. F. PARKES WEBER remarked on the yellow tint of the skin, which was present in both these patients. He thought the cause would turn out to be the presence of some vegetable pigment in the food. The yellow tint varied in degree from time to time. Some individuals seemed liable to get such skin pigmentation from eating carrots (from carotin) or swedes.¹

¹ *Postscript*.—This yellow coloration, or "xanthosis" of the skin, in some diabetics was, however, described by H. Salomon and C. von Noorden at the International Dermatological Congress of 1904. Since then the same coloration has been noted in healthy persons by H. Salomon, *Wiener klin. Wochenschr.*, 1919, xxxii, p. 495.—F. P. W.

Dr. J. C. SPENCE asked by which method the estimation of the blood-sugar was carried out in these cases. It would appear that in the first case the renal threshold was about 0.28 per cent., as with the blood sugar at this level only a trace of sugar appeared in the urine. Even if one took into account the fact that as the disease progressed the threshold, or "leak point," rose, yet in this case it appeared to be unduly high. In the normal child the level at which the kidney excreted sugar was about 0.16 or 0.17 per cent. He raised the point because in some methods of estimation depending on the use of a colorimeter there was a tendency in certain cases, especially those of kidney disease, to give at least 50 per cent. too high a reading. He said this had recently been pointed out by de Wesselow, who had used MacLean's method of blood-sugar estimation.

Dr. GRAHAM (in reply) said the method he used was Bang's method, which he regarded as a reliable one. The level of the leak point varied very much. With some it was 0.1 per cent. but usually 0.18 per cent. It was said by some that when the leak point rose, it was a sign of evil import. There were some cases of severe diabetes in which the blood-sugar might be up to 0.3 or 0.35 gm. per cent., and yet they might pass practically no sugar in their urine. So far from it being of evil import, he considered that it was a protective mechanism. In each of these children the leak point was high, and that was the reason, in his judgment, why they had lived so long.

Recurrent Facial Paralysis.

By FREDERICK LANGMEAD, M.D. (President).

HER mother states that this girl has had three attacks of facial paralysis, always first noticed in the morning. The first when she was a baby lasted a few days and then cleared up completely. The second about a year ago, equally transient. The present has lasted several weeks. There is no evidence of ear disease. Suggestions as to aetiology and treatment are invited.

DISCUSSION.

Mr. E. D. D. DAVIS asked whether the ears of this patient had been carefully examined. Attacks of otitis media in children, even without suppuration, occasionally caused facial paralysis. This child had enlarged tonsils and an adenoid growth, hence the probable attacks of otitis media. The mother stated that the child had been deaf, and was usually deaf during a bad cold.

Dr. F. PARKES WEBER said the case suggested to him a local cause in the bony course of the nerve, due, perhaps, to recurrent inflammatory swelling. He could not help thinking of recurrent cases of so-called "ophthalmoplegic migraine" in this connexion.

The PRESIDENT (in reply) agreed that operation on the throat was necessary, as there was some nasopharyngeal obstruction; the teeth also required attention. He had only seen the child once before that day. The mother said that there had been no pain with any of the attacks, and the membrane was apparently normal.

Osteogenesis Imperfecta.

By FREDERICK LANGMEAD, M.D. (President).

A. P., MALE, aged 6½ years. Birth easy, no abnormalities noted. Twin, illegitimate, and fed for first two years on Nestlé's milk and Neave's food. Nothing abnormal was noted by grandmother until he failed to begin walking or moving about at usual time. Always languid, pale and irritable, and failed to thrive or grow. Up to now he has never walked, and when sat up, has always wanted to lie down, crying and seemingly in pain. Has had frequent "colds"; no other illness noticed.

On admission to hospital, very pale, deformed and undersized; total length only 29 in. Eyes prominent and face looking pained and careworn. Head large, square, and bossed, measuring 19 in. in circumference, or about two-thirds of the body length. Signs of rickets pronounced. Chest distinctly rachitic, with ribs steeply beaded. Much kyphosis and some scoliosis. Epiphyses excessively enlarged and bones curved. General muscular hypotonia with laxity of joints present. This is well seen in metacarpo-phalangeal joints where considerable hyperextension is possible. Fractures of left humerus and in both femora, and greenstick fracture of left clavicle. He cries if manipulated, and is only comfortable when lying down.

Blood picture: Red corpuscles, 2,827,000; hæmoglobin, 48 per cent.; colour index, 0·89; white cells, 6,800; of the latter 43 per cent. are polymorphs, 42 per cent. small lymphocytes, 12 per cent. large lymphocytes, 3 per cent. large mononuclears. Much polychromatophilia and slight poikilocytosis. Radiograms show clear-cut fractures of long bones surrounded by large amount of callus at points where bending is greatest.

DISCUSSION.

Dr. EDMUND CAUTLEY said the fact that the child commenced to walk at about the usual age was against the idea of this being ordinary osteogenesis imperfecta. There was a greenstick fracture of the clavicle; all the fractures were not clear-cut, and around one of the fractures there was much callus, more than was seen in cases of osteogenesis imperfecta. He favoured the exhibitor's second suggestion, that it was a severe case of rickets, and that the backwardness and malnutrition were part of the same condition.

Dr. MORLEY FLETCHER agreed with Dr. Cautley's view, that this was a case of severe rickets, with fractures.

Dr. H. C. CAMERON said the problem was very difficult to solve. The skiagram did not reveal strikingly the expansion of bone seen in most cases of osteogenesis imperfecta. In that disease the bones were not only much bent, but their shafts were broader than normal. Not all cases of osteogenesis imperfecta had abnormal ossification of the skull. On the whole, the evidence in this child of osteogenesis imperfecta was not conclusive, while the rickets was so severe that he agreed with Dr. Cautley that rickets had been responsible for the many fractures.

The PRESIDENT replied that he still felt some doubt whether rickets could account for the whole of the picture presented by the patient. That rickets in a severe form was present was obvious, and the diet had been ideal for its production. His reasons for suggesting the co-existence of osteogenesis imperfecta were the great fragility and translucency of the bones, the occurrence of numerous clear-cut fractures without history of injury, and the account given by the grandmother that the child had never shown normal activity even before the age when rickets occurred. In osteogenesis imperfecta greenstick fracture of the clavicles occurred, and also a considerable amount of callus about fractures in long bones was not unusual. Dr. Langmead added that the whole question of nomenclature and differentiation with regard to this class of conditions was in a very confused state, and there was need for much useful histological work on bone.

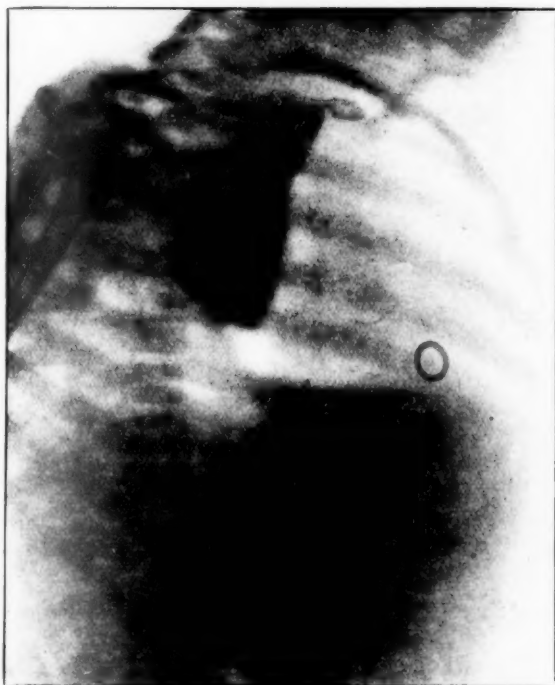
Case of Œsophageal Obstruction in a Girl, aged 4½ Years.

By REGINALD C. JEWESBURY, M.D.

THE child has never been able to swallow solid food from birth, but has no difficulty with fluids. Bougie can be passed 5½ in. from the teeth. X-ray with bismuth meal shows large shadow at lower end of œsophagus. I am indebted to Dr. Rawlinson for the X-ray.

DISCUSSION.

Dr. EDMUND CAUTLEY said such cases were rare and difficult to deal with. Here was stenosis of the lower part of the œsophagus, with bulging of the upper part in the usual situation. In the common type of malformation the upper part ended blindly in a pouch and the lower end opened into the trachea. The chief interest was in regard to treatment. He doubted whether anything could be done which would be of permanent value, but he recommended dilatation by bougies passed through the mouth or after a preliminary gastrostomy.



Dr. H. C. CAMERON asked how spasm was excluded. He thought if there were organic stricture that the child would be more wasted, whereas its nutrition was good.

The PRESIDENT spoke of a child whom he had shown who had spasm of the lower end of the œsophagus. Fluid had been returned even within a few hours of birth. The child was younger than that shown by Dr. Jewesbury, and

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by œsophagoscopy nothing abnormal was seen. Under an anæsthetic a tube could very easily be passed.

Mr. E. D. D. DAVIS said he had passed an œsophagoscope in children 2 years old and younger, and coins, where impacted in the gullet, were frequently removed with its aid.

Dr. JEWESBURY (in reply) said perhaps he ought not to have been quite so dogmatic about the absence of spasm in this child. A surgeon had promised to examine the case with the œsophagoscope, but had not yet done so. He thought the persistent return of solid food indicated organic obstruction, also the fact that the stricture was at least an inch above the cardia and did not involve the sphincter. While in the hospital she had never had difficulty with fluids. Repeated screen examinations showed the same condition each time, and he thought organic trouble in the nature of a congenital stenosis was the explanation.

Postscript.—January 4, 1921: Since showing this case Mr. E. D. D. Davis has kindly examined it for me with the œsophagoscope; this showed a small circular opening about $\frac{1}{8}$ in. in diameter at the level of obstruction. This was dilated with bougies, and since then the passage of food has been less difficult. Mercury tubes are now being passed up to size No. 4.

Malformation of Face, Ear, Eye, and Hand.

By E. G. DRU DRURY, M.D.

(Photographs shown by B. WHITCHURCH HOWELL, F.R.C.S.)

THE male infant, whose photographs are shown (figs. 1 and 2), was the third of three male children, born at full term. The parents and brothers were in all respects healthy, the father being a member of the South African police. The mother's family yielded an uncle of the patient of defective mentality, and a doubtful account of an aunt with "lumps on the back of the head," supposed to resemble the ear of the patient. No further indications of "bad stock" could be elicited.

Medical assistance was called after the birth because the child had a double thumb on the right hand and a deformed ear. It was evident that more was involved than an imperfectly formed auricle, for in place of an external meatus there was a shallow pit lined by skin, and from the angle of the mouth to a point just below the pit ran a white line, as

straight as if ruled, which was inelastic, as shown when the child cried, and was plainly due to imperfect fusion of the mandibular and maxillary portions of the face. Finally, the outer third of the conjunctiva of



FIG. 1.



FIG. 2.

the left eye was piled up in a dull white puckered tumour attached to the limbus of the cornea, like a huge pterygium, which later on prevented satisfactory closure of that eye.

M—CH 1a

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The extra two phalanges were removed from the thumb on the fourteenth day, and no deformity persisted. Two anterior tubercles of the auricle were ligatured at the same time and cut off, the stumps healing well. The tubercles contained cartilage. Neither the eye condition nor the external meatus were interfered with.

The child (now aged 1 year) shows marked facial asymmetry, but is healthy, strong, apparently of normal intelligence, but it is not possible to decide yet whether there is any hearing on the left side.

Section for the Study of Disease in Children.

President—Dr. FREDERICK LANGMEAD.

Two Cases: (1) Oxycephaly and (2) Acrocephaly, with other Congenital Deformities.¹

By REGINALD C. JEWESBURY, M.D., and J. C. SPENCE, M.B.

THAT congenital deformities of the limbs may occur in combination with oxycephaly and other skull deformities is generally appreciated. In 1906 Apert attempted a differentiation of these conditions from other congenital malformations, proposing the descriptive title of "acrocephalo-syndactylism." Even such a term as this is too narrow. The deformities are rarely limited to the fingers or toes, and in many cases actual webbing is not a feature. Recently Park and Powers have published in the *American Journal of Diseases of Children*, October, 1920, an elaborate review of twenty-nine cases which they have collected from the literature. They include the cases which have been shown already before this Society by Dr. Morley Fletcher in 1908, Dr. Robert Hutchison in 1910, Dr. G. Carpenter in 1908 and 1910, and Dr. H. C. Cameron in 1919.

The following are the notes of our cases:—

CASE I (FIGS. 1, 2, 3, 4.)

M. S., aged 3 weeks, female. The seventh child of healthy parents, the other children are normal. No miscarriages or stillbirths. There is no history of congenital deformities in any of the members of the paternal or maternal families for the past three generations. There is no history of syphilis or alcoholism in either parent. Born at full term; labour was easy and rapid. The mother had been in good health during pregnancy. The fetal movements had been quite normal. The deformities were obvious at birth, but the child was virile, took the breast readily and cried lustily. The nasopharyngeal obstruction has given rise to difficulty in feeding but she has maintained her birth weight.

Physical Examination.—A small child, weight 5 lb. 10 oz., length 18½ in. She is active and cries loudly. The head is typically oxycephalic in shape (figs. 1 and 2). With marked prominence and bulging in the temporal areas it is roughly pyriform in shape, and mounts up to reach its greatest height near the anterior fontanelle. The forehead is rounded and globular. There is irregular closure of the fontanelles and sutures: the anterior fontanelle remains open, 3½ in. in length, 1½ in. in width; the posterior fontanelle is firmly closed; the antero-lateral fontanelles on both sides are open, greatest width 1 in. The coronal sutures between the anterior fontanelle and antero-lateral fontanelles are firmly closed. The metopic suture remains widely open and extends to within an inch of the glabella. The lambdoidal sutures and the posterior

¹ At a meeting of the Section, held November 26, 1920.



FIG. 1.—M. S. (Case I). The oxycephaly, prominence of the eyeballs, and deformities of the ear are well shown.



FIG. 2.—M. S. (Case I). Showing the deformity of the skull, depression of the nasal bridge, and position of the ears.



FIG. 3.—M. S. (Case I). Synostoses of radius and ulna. A similar condition was present in the left arm.



FIG. 4.—M S (Case I). Showing deformity of thumbs and other bony changes.

half of the sagittal suture are firmly closed, and their positions are marked by prominent bony ridges, which, meeting on the position of the posterior fontanelle, produce a rough and irregular bony mass. There is no cranio-tabes. The measurements of the head are: Circumference, $12\frac{1}{2}$ in.; greatest width, $3\frac{3}{4}$ in.; greatest length, $4\frac{3}{4}$ in.; projective tragus-vertex height, $4\frac{3}{4}$ in.; chin-vertex height, $5\frac{1}{2}$ in. This shows great increase in the vertical diameter, and the tragus-vertex height is that of a child aged $4\frac{1}{2}$ years. The face is flat and broad. There is depression of the bridge of the nose so marked that it lies in the same plane as the inner canthus of each eye. There is extreme prominence of the eyeballs. The ears are misplaced and malformed, their long axes incline backwards at an angle of 45° . The gums are thick and gross, with hyperplasia of the soft tissues. In the upper jaw both first molar teeth have erupted. They were present at birth, and judged by their size must have appeared in the seventh or eighth month of foetal life. There are deformities of the arms, hands, and feet. These are: Limitation of movement at the elbow-joints; malformed thumbs, which are flail-like, as mere appendages to the outer edges of the hands: little fingers which are small and curved as in some mongolian idiots; a malformation of the great toes which are short and in a position of hallux varus; disproportion in the size of the four outer toes, all being of equal length and size. These deformities are all exactly symmetrical. There is no congenital heart disease, transposition of the viscera or deformities other than those already described.

X-ray Examination (figs. 3 and 4).—Skull: The abnormal conditions of the fontanelles and sutures is confirmed. There is no evidence of digital impressions indicating convolitional atrophy of the skull bones as has been described in some cases of this condition. Arms: In both forearms there is synostosis of the radius and ulna in their upper thirds (fig. 3). In the hands the abnormal condition underlying the deformity of the thumbs is revealed; the terminal phalanges are larger than the proximal phalanges, and are so placed as to suggest absence of proper joint structures between them. An exactly similar condition is present in the great toes. The metacarpal bones in both hands are irregular in size, but the form and arrangement is again remarkably symmetrical (fig. 4).

CASE II (FIGS. 5, 6, 7, 8).

S. M., aged $5\frac{1}{2}$ years, male. The first child of healthy parents; the father is aged 31 years, the mother 37 years. The blood Wassermann reactions of both parents are negative. There is one other child, a healthy normal infant 12 months old. No miscarriages nor stillbirths. A history of congenital deformities in the child of a paternal uncle was elicited; this child had "claw fingers" and resembled this patient, S. M., in appearance. It died in infancy. Born at full term, S. M. weighed 12 lb. at birth. Labour was prolonged and difficult, forceps were used; there was no undue birth injury. Immediately after birth the deformities of the fingers and, a few days later, the corneal opacities were noticed by the mother. They have remained unaltered since. He has had no illnesses and has thrived well. He did not walk until the age of 2 years. He was backward in talking. He could not speak until the age of 3 years; before then he was able to express himself by grunts and gestures. He cannot read or write. His intelligence is limited, but he is by no means an idiot. He has been clean in his habits since his second year.

Physical Examination.—The boy is of normal height and weight, $41\frac{1}{2}$ in.

and 41 lb. He presents a curious appearance: the face is broad, fat, and "full-moon" in shape. There is depression of the bridge of the nose and prominence of the eyeballs. The head is high, short and broad. The face and posterior surface of the skull are in almost parallel plane. The increased height of the head is due to an abnormal extension upwards of the cranial vault. There is no actual oxycephalic deformity as in Case I; the increase in height being uniform and not culminating in a tower-shaped or pointed eminence. The condition is rather one of brachycephaly and acrocephaly.



FIG. 5.—S. M. (Case II). Showing the deformities of the fingers and limitation of movement at the elbow-joint.

Other abnormalities are present in the eyes, forearms and fingers. In the corneæ there are uniform faint opacities. No disease of the fundi nor alteration in the fields of vision were detected. There is limitation of movement at both elbow-joints, full extension and supination are impossible. In both hands there exists a condition of "claw fingers." All the digits are affected. The terminal phalanges are flexed, and the fingers cannot be straightened. These

deformities are exactly symmetrical. The feet are not affected. Examination of the blood and urine gives normal results. The cerebro-spinal fluid is normal. The Wassermann reaction of both blood and cerebro-spinal fluid is negative. There is no polyuria. The child's sugar tolerance was determined by the blood sugar glucose tolerance test, blood sugar estimations being done by MacLean's method. The results were: Blood sugar, fasting level, 0.098 per cent.; half hour after 20 gm. of glucose, 0.129 per cent.; one hour after the glucose, 0.106 per cent. This is almost a normal curve for a boy aged 5 years, so his sugar tolerance is normal.



FIG. 6.—S. M. (Case II).

X-ray Examination (figs. 7 and 8).—Skull: There is no evidence of areas of "digital impression" indicating convolutional atrophy of the vault of the skull. The coronal suture is not quite closed; the other sutures are closed. The pituitary fossa is altered in shape. It is twice its normal length, and the anterior clinoid process lies horizontally backwards. There is no erosion nor absorption of surrounding bone such as is seen in pituitary tumours. The change in shape of the pituitary fossa is probably the result of the general bony deformities affecting the base of the skull. Hands (fig. 7): The metacarpal and phalangeal bones are irregular in shape. These changes are exactly symmetrical, and are best seen in the fifth metacarpal bones. In both hands these bones, though differing essentially in size and shape from

normal standards and from the other metacarpal bones, are yet exactly similar in size and shape. The proximal phalanges tend to be cone-shaped. The terminal phalanges are smaller than normal. X-ray examination of the other parts of the skeleton failed to reveal further abnormalities.



FIG. 7.—S. M. (Case II). The arrangement and form of the bones in the other hand are exactly similar to those of the right hand shown here.

DISCUSSION.

Dr. MORLEY FLETCHER thought the second case presented some points in common with oxycephaly, as the head was pointed, though it did not show the other characteristic malformation—i.e., protrusion of the eyes. Oxycephaly was one of the few well-marked deformities of the skull which was rarely associated with mental defect. The fact that this boy was backward would make one suspicious about its being a typical case of oxycephaly. Another important point was, that the skiagram of this skull showed a fairly uniform thickness of bone. In every case of oxycephaly he had seen there was an irregularity in the texture of the bone, causing a curious dimpling and thinning, called "digital" marking. That was absent in this skull. He did not know what the digital marking meant, as it was not merely an effect of pressure; it was not seen in hydrocephalic skulls. The first case was a well-marked instance of oxycephaly in an infant. He would like to know whether this patient showed changes in the optic fundus, because the importance of oxycephaly, clinically, was that in older children it was so frequently associated with the development of optic atrophy, sometimes with blindness, due either to the intracranial pressure or to kinking of the optic nerve. In such a case, if there were papilloedema, craniotomy would be indicated; it had been several times performed in such cases with beneficial results. This child should be watched, and if signs developed, the operation should be done.

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Dr. H. C. CAMERON said he had lately seen two severe cases of acrocephaly in infants: both died. This first case did not seem likely to survive. Those which did survive were relatively less severely affected than this. Both of his cases had similar deformities, symmetrically disposed, in the great toes and in the thumbs. In both there was polysyndactylism, and this feature had been described as common. Double thumbs and double great toes were fused into one. Did the members of the Section present think the degree of the condition in the first child seem compatible with its continuing to live? One knew how easily these cases with polydactylism and gross deformities of the fingers slipped out of life.



FIG. 8.—S. M. (Case II). Note shape of skull and sella turcica.

Dr. JEWESBURY (in reply) said he had not shown the second case as a true type of oxycephaly, only in certain respects did it appear to resemble that condition. Might it not be some other condition, possibly due to some derangement of internal secretion? The bony changes of the skull referred to by Dr. Morley Fletcher were not revealed by the skiagram of this case. In the first case there had not been time properly to examine this infant, as it had only been seen for the first time that morning. He thought everyone would agree it was a typical case of oxycephaly. In most such cases there was optic atrophy, and he would report, later, whether it was present in this

patient. In the American paper to which he referred in his notes, there were all kinds of syndactylism, fusion of bones of the feet, and other bony deformities present at the same time as the deformity of the skull. He could not make any suggestion as to the origin of the condition; it seemed to be an abnormal congenital condition, primarily of the bones. There appeared to be an irregular synostosis of the bones of the skull, and those at the base united too early. In this case certain sutures were united, others not. The metopic suture was open and the coronal and sagittal closed. In that way an irregular synostosis had occurred.

Postscript.—The fundi oculi were examined by Mr. A. C. Hudson and found to be normal.

Lesion of the Crus Cerebri in a Girl, aged 7 Years.

By REGINALD C. JEWESBURY, M.D.

IN July, 1920, her memory appeared to be affected. One month later the left pupil became dilated, followed a little later by ptosis of the left eyelid. In September, 1920, a right-sided hemiplegia gradually appeared. The condition has been gradually progressive. She now shows a complete third nerve paralysis on the left side with a hemiplegia on the right.

Section for the Study of Disease in Children.

President—Dr. FREDERICK LANGMEAD.

Case of Patent Ductus Arteriosus.¹

By J. PORTER PARKINSON, M.D.

THE patient, a girl, aged 7 years, was admitted for cough and spitting of a small amount of blood which apparently came from the throat. The family history was unimportant. She has never been a strong child, and has had influenza, measles and chicken-pox. In 1915 she spat up a little blood, and this continued for about two months, and she has had these attacks each following year, being well between the attacks.

Patient is a child of low intelligence, with a mongolian type of cranium. Cranial circumference 47 cm. No cyanosis nor clubbing. The apex of the heart is in the fifth intercostal space, $\frac{1}{2}$ in. inside the nipple line. The right border of deep dullness is $\frac{1}{2}$ in. to the right of the right sternal edge; the left border of dullness is continued upwards in the third and second intercostal spaces, gradually approaching the sternum. There is no thrill. In the second left intercostal space, near the sternum is heard a loud harsh murmur continued through the systole into the diastolic period; this murmur is heard, though less loudly, all over the cardiac area, in the vessels of the neck, and at the back of the chest, especially on the left side. The pulmonary second sound is not intensified. The lungs and abdomen appear normal, and there is no enlargement of the liver or spleen.

The case appears to me to be typical of patency of the ductus arteriosus. The enlargement of the heart to the right was evident on percussion and confirmed by the skiagram, as was also Gerhardt's "line of dullness" prolonging upwards the dullness of the heart and due doubtless to dilatation of the pulmonary artery. The only usual signs absent are the thrill and accentuation of the pulmonary second sound. This latter I suggest may be due to patency of the interauricular septum.

DISCUSSION.

Dr. F. PARKES WEBER said that the kind of murmur (as long ago described by Dr. G. A. Gibson) heard in Dr. Parkinson's case was not always present in cases of patent ductus arteriosus. A recent writer had in fact gone so far as to suggest that it was never present, unless endocarditis (or rather, perhaps, malignant endarteritis) were added to the already patent ductus arteriosus. This, however, was almost certainly not correct, and Dr. Parkinson's case furnished evidence against it.

The PRESIDENT said that he felt fairly certain that in many cases of the kind there was only a systolic murmur, and not a double murmur at all, though he agreed that when the latter was present it was very characteristic of the lesion.

¹ At a meeting of the Section, held January 28, 1921.

Case of (?) Idiopathic Dilatation of the Colon.

By Sir THOMAS HORDER, M.D.

I attach this title to the notes for want of an exact diagnosis. I only saw the child for the first time a few days ago. The skiagrams were only completed this morning, and I am not surprised to find from them that there is dilatation of the stomach also. The boy's age is $6\frac{1}{2}$ years, and he is otherwise quite healthy. He has a large abdomen, and the costal arch is symmetrically expanded. The abdomen is tympanitic. No large veins are visible over it, nor is there ascites, and to-day there is no visible peristalsis. There is no fever, and the child does not sweat or vomit; neither is there cardiac or renal disease. He is intelligent and an only child, and the mother says his abdomen has always been large. Two years ago, as the abdomen became more distinctly enlarged, he was taken to Dr. Sansom, who excluded tuberculous peritonitis and other serious trouble, and ordered massage and exercises. He improved a good deal with these measures. A month ago he became worse, and this arose from a nervous upset, for his mother stated that under excitement the abdominal swelling was more marked, and that then there was pain, though not at other times. Much wind is passed *per anum*, but he does not eructate. It is not believed that he swallows air, and there has been no loss of weight. The skiagrams shows considerable dilatation of the stomach, the situation of which is rather peculiar: it lies athwart the abdomen, but is not in any sense dropped, despite obvious lack of tone. The pyloric segment lies at the top of the right iliac fossa. There is no conspicuous delay in the passage of an opaque meal. There is considerable dilatation of the cæcum and ascending colon, but the transverse colon does not appear to be dilated, but is contracted in parts, and may be spastic. The boy is not constipated. The sigmoid was of normal size, but lay to the right of the mesial line.

The case does not seem to conform to any of the types of colon dilatation described as idiopathic. I am asking for suggestions as to treatment; if the condition should become worse, should surgery be thought of? If so, what operation would be proposed? The stools do not present any special characters.

Dr. G. DE BEC TURTLE regarded the case as probably belonging to a group of cases in which there was a spasm of some part of the intestinal tract.

Case of Rheumatoid Arthritis.

By FREDERICK LANGMEAD, M.D. (President).

S. B., A BOY, aged 6 years, was first seen when 1 year and 9 months old. At that time there was considerable swelling over the dorsa of the hands and feet not limited to the wrists and ankles, a combined macular and papular rash, areas of erythema over the breast and arms, and offensive motions. I regarded the rash and œdema as toxic in origin and connected with the offensive stools, but treatment directed to the latter proved valueless, the rash and œdema persisting and the boy was admitted to hospital. About this time he developed fixation of the neck, which was very painful and led to

cervical caries being suspected, although this was negated by X-rays. Dr. W. S. Colman, under whose care the child was while in hospital, made the tentative diagnosis of rheumatoid arthritis, which subsequently proved to be the explanation. Later the swelling of the hands became more localized to the wrist-joints and he developed also swelling of the ankles.

After discharge from hospital, he remained pale and looked ill, the joint swellings varying considerably from time to time. The only treatment which appeared to benefit him was thyroid in small doses and under this he gradually improved until I lost sight of him in May, 1917. In August, 1917, during my absence, he was again admitted for fever, breathlessness and further painful swelling of the joints and painful stiffness of the neck. After that he again improved, though he did not lose the joint swellings and stiff neck. In January, 1920, after a "cold" he again became feverish, complained of pain in the left ankle; the joints became more swollen and a purplish macular rash appeared on the knees. On admission again his temperature was normal but pulse 156, and pallor was obvious. About the wrists and ankle-joints were symmetrical periarticular swellings reaching from the lines of these joints to the metacarpo- and metatarso-phalangeal joints. The swelling was limited to the dorsal surfaces. Glands were enlarged in the axillae and groins. A purplish erythema affected both forearms. Besides the tachycardia a slight systolic murmur, limited to within the apex, was audible. The spleen was palpable, reaching about 1 in. below the ribs.

With regard to possible sources of infection, there were two carious teeth, and a nasal discharge; the urine was sterile and the stools yielded no lactose-fermenting organisms and no excess of Gram-positive organisms (Dr. Nabarro). An X-ray (Dr. Ironside Bruce) revealed "marked general bony changes in the tarsus and carpus, which showed advanced ossification as compared with the metatarsus and metacarpus; some signs of localized destruction of bone."

While he was under observation in hospital there was an irregular fever at intervals of two or three days, his temperature sometimes reaching 102° or 103° F., and subsiding within an hour or two. The rises of temperature were not associated with any subjective signs, but a patchy pink erythematous rash appeared on the chest.

A vaccine was prepared from the predominant organisms of the stools (*Bacillus coli* and streptococci) but there was neither local nor general reaction to 25 millions of each administered on two occasions. Later the rash spread to the arms and thighs both on their flexor and extensor aspects, the patches of erythema varying from the size of a pea to that of a sixpence. Another dose of the vaccine (50 millions of each organism) again produced no kind of reaction and failed to affect the disease; the stiffness of the neck and the swelling of joints became more marked and an irregular temperature and slight tachycardia persisted.

A culture from a septic tooth grew only *Micrococcus catarrhalis* and streptococcus, and a vaccine prepared from them also failed to produce a reaction.

Owing to infection in the ward the boy was discharged after three months, in April, 1920.

He has since been attending the out-patient department and has again improved under thyroid treatment, the joint swellings and fixity diminishing, the spleen becoming smaller and no further rash having appeared. There is still some stiffness of the neck.

The case is shown to illustrate: (1) The early œdema, resembling toxic

oedema of rheumatoid arthritis; (2) the association of a rash with each recrudescence of joint swelling and pain; (3) the value of thyroid treatment in certain cases of the disease.

DISCUSSION.

Dr. F. PARKES WEBER asked whether the exhibitor had ever seen these rheumatoid conditions in children associated with psoriasis. He thought that the cutaneous eruption in the present case was a form of erythema exudativum, and perhaps it took the place of the psoriasis sometimes found associated with bad rheumatoid arthritis in adults.

Dr. MILNER BURGESS asked whether the President had ever tried antistreptococcic serum for this condition.

The PRESIDENT (in reply) said he did not remember psoriasis being associated with this condition in children. He had not himself tried antistreptococcic serum for the condition, but he had seen it tried a number of times without obvious benefit. He did not distinguish between rheumatoid arthritis in children and Still's disease.

Case of Obesity.

By FREDERICK LANGMEAD, M.D. (President).

M., AGED 11½ years, was admitted to hospital in February, 1920, for "excessive fatness," which had been gradually increasing for one year. He is the eldest of four children, the two youngest of whom have died, one of bronchopneumonia, the other of diarrhoea and vomiting. His only illnesses have been a severe attack of "diarrhoea and vomiting" when aged 1 year, after which he was greatly wasted, and poliomyelitis which was not detected until he began to walk when 1 year and 5 months old. The atrophy and weakness of muscles is confined to the right leg.

At 9 years old, the boy was a thin weakly child, pale and ill-nourished; at 9½ years he appeared well-nourished; at 10 years he weighed 5 st. 8 lb. and four months later 6 st. 12 lb. The excess of fat appeared first on the trunk. He suffered every three or four days with nausea and severe frontal headache.

When he came under observation his appearance was that of a boy aged 13 or 14 years rather than of 10½ years. There was general excess of fat, more marked on the trunk, where it was thrown into folds. The breasts showed a condition of gynecomastia. The genitals were normally infantile. Teeth were normal. No precocious development of hair. Supraclavicular fat not disproportionately excessive.

Intelligence good and no abnormal nervous signs (except those of poliomyelitis). The urine was not increased and contained no sugar. He was given 120 grm. of sugar after the bladder had been emptied and three hours later passed urine containing 0.2 per cent. of glucose. An X-ray examination of the skull was negative.

Treatment by pituitary extract was given, 8 minims of pituitrin (i.e., a 20 per cent. extract of the posterior lobe) being combined with an extract of anterior lobe of an ox's pituitary (each dose containing 5 gr. of the dried lobe). This was injected into the buttock. At first four doses were given in five days and led to a decrease in weight by 2 lb. 5 oz. When this was followed by weekly doses, the weight steadily increased again, and when discharged after one month, he weighed 12 oz. more than on admission.

When next seen in the out-patient department on March 23, 1920, he

weighed 7 st. Thyroid (2 gr. daily) was given and on September 11, the weight, after slight fluctuations, was still 7 st. A slight illness then caused it to drop to 6 st. 10½ lb.; the thyroid was discontinued, and a fortnight later he had gained 2½ lb. Thyroid (3 gr. daily) led at first to a decrease of weight but after a month it again increased to fat again with 3 gr. daily. His last weight is 6 st. 9½ lb., which is less by 2½ lb. than in January, 1920. He is more normal in appearance and has grown considerably. There is no evidence of gonadic disability.

The case is regarded as one of subnormal activity of the thyroid gland, and the question is raised as to whether the obesity often met with after recovery from severe inanition in children may be so explained.

In my opinion some of these children are such slight variants from the normal that they cannot be regarded as abnormal. Some appear to be instances of hypothyroidism, rather than of hypopituitarism. Whether the improvement seen is due to the thyroid hastening metabolism, I do not know. I invite opinions on the case.

Dr. E. A. COCKAYNE said he saw cases such as the present one more often than he saw frank cases of hypopituitarism. Those he had seen during the last year or two had shown no real evidence of hypopituitarism; the children were mentally quite alert and up to the standard of the average scholars at school; they were keen on games, in which they indulged as far as their stoutness admitted. He tried the sugar tolerance of one or two, and found no abnormality in that regard. Neither did skiagrams of the skull reveal any unusual feature in the pituitary fossa. He did not regard these as cases of hypopituitarism, although in some books they were classed with undoubted cases of that condition. He had tried thyroid extract, and a little loss of weight resulted, but he doubted whether these cases were due to deficiency in thyroid secretion.

Case of Sclerodermia and Sclerodactylia.

By H. MORLEY FLETCHER, M.D.

(Shown and described by Dr. L. W. BATTEN.)

THE patient is a girl, aged 11 years, who came under observation in 1916, when it was stated that she had been healthy until a year before. At that date she had pain and stiffness in her knees and thighs, and she began to get thinner. When admitted to hospital she weighed only 28 lb. The skin was noted as being smooth and shiny, the joints stiff and painful, but not swollen. After she had been in hospital twelve days, nodules appeared over the shoulders, and later on knees and thighs. The nodules came out in crops, new ones each day. At the same time her temperature, which had been normal, rose to 101° F., and remained irregular, and 90 gr. of sodium salicylate daily did not control it. A few days later she developed pediculosis and suppuration of the scalp; indeed she seemed very susceptible to cutaneous infection, as she had it twice in the four visits to hospital. Some of the nodules disappeared while she was under observation, some remained. No cardiac lesion developed. In ten weeks she was discharged with the diagnosis of nodules, rheumatic in character. A few months later she was readmitted, this time with the joints stiffer, and the diagnosis of sclerodermia was made. In July, 1919, she was again admitted, in much the same condition as at present, and her weight was 2 st. 8½ lb. She then, as now, had nodules on the abdomen, and the joints were getting stiffer. The skiagrams shown, which were taken at this time, indicate destruction and absorption of bone close to the interphalangeal joints. The family history

and the Wassermann reaction are negative. Four younger children are alive and well. A section of one of the nodules shows only fibrous tissue, it is definitely not calcareous. Her teeth are in a bad condition, and have been treated to some extent. Thyroid extract has been given for considerable periods, but without appreciable improvement. She was put on a course of pituitrin and extract of the anterior pituitary lobe on alternate days, $\frac{1}{2}$ c.c. of each, and this was continued several weeks, again without effect.

Dr. Morley Fletcher would be glad of suggestions as to aetiology and treatment.

DISCUSSION.

Dr. F. PARKES WEBER remarked that the fibrotic changes were not confined to the skin and subcutaneous tissue, but that they had led to stiffness of some of the small joints of the feet, and perhaps affected some of the muscles, so as to produce a slight "myositis fibrosa." The most remarkable feature was the presence of the numerous subcutaneous nodules. He felt sure that, owing to the position of some of them (about the scapula, &c.), these nodules were of the rheumatic type, but more chronic than typical rheumatic nodules and, in this case, probably not associated with any endocarditis. He knew of no other case of sclerodactylia associated with chronic rheumatic nodules as in this case, and he did not think a similar one had ever been described. Considerable delay in the general growth of the body was another feature in the present case. Exposure to cold and bad feeding might possibly act as exciting causes of sclerodactylia in children, who in some way were predisposed.

The PRESIDENT said that there existed without doubt a disease (as described by Dr. Nixon) in which there were not only scleroderma, and sometimes sclerodactylia, but also fixation of joints, probably due to synovial changes, fibrosis of muscle, and less frequently pericarditis and pleurisy. It was difficult to say whether that was the same as ordinary scleroderma in a pronounced form, or whether it was something akin. This case reminded him of a child he showed with sclerodactylia and scleroderma, with fibrosis of muscles and fixation of small joints—fingers, wrists, ankles, and also knees, partly due, he thought, to an associated synovitis, partly to fixation of skin and muscles. He had shown another case in which there was thickening of skin, much like that in scleroderma, fixation of joints, and the presence of nodules; though in that case the nodules were those of calcinosis. A point against these nodules being rheumatic was that some were in the subcutaneous tissue of the abdominal wall remote from the mid-line. It was very important that cases of this kind, when met with, should be brought forward for discussion; they were little understood, and there seemed to be a connecting link between them.

Mr. WHITCHURCH HOWELL (discussing the case from the point of view of treatment) suggested the coaxing of the affected joints into the optimum position of utility to enable the child to walk and feed itself. The feet might be coaxed into ankylosis at a right angle, with a good arch. One knee should be done at a time, because if more than one joint was attempted at the same time, there was a tendency for the condition to flare up. As to the hips, he thought the child would be best treated on a double Thomas's abduction frame. The nurse said that at present the child could feed herself, but with difficulty. The joints were likely, however, to stiffen in a position which would produce awkward hands. He would coax the right hand slowly up to a posture of dorsiflexion on a cock-up splint, then secure a supination twist, after the collar-and-cuff method of Sir Robert Jones. Then there would be further flexion of the right elbow-joint; the left elbow would probably become fixed. Into what position should the elbows be ankylosed? The left one seemed to be ankylosing in a rather good position for use; one must be ankylosed half-way between pronation and supination, and the other at full supination. Efforts should also be made to increase the child's intelligence, and the combined measures would make her feel less "out of it" with other children; this feeling very probably accounted to some extent for her thinness.

Dr. BATTEN (in reply) said the girl no doubt came from a bad home environment. Each time she had entered the hospital she had a fresh crop of pediculosis. He could not say whether she had been much exposed to cold.

Infantilism with marked Increase of Subcutaneous Fat.

By W. J. PEARSON, D.S.O., M.D.

FEMALE child, now aged 5 years 11 months. First attended in February, 1920 (then aged 5 years) with history of wasting for eight months; anorexia, puffiness of eyes, for two months; some cough, not feverish. Family history: Father killed in war; four children living, this child was fifth child. There was a miscarriage at three months between first and second child. Mother was 41 years old when the patient was born. Past illness: Measles at age of 3 years; tonsils and adenoids removed one year ago; full term; breast fed nine months; walked at the age of 13 months; talked at the age of 10 months. When first seen at this time the child was well nourished, abdomen was full; nothing abnormal found in heart, lungs, or abdomen. Weight $31\frac{1}{2}$ lb. (average for age 38 lb.). For the next four months the weight did not improve, and in June, 1920, was $30\frac{1}{2}$ lb. Child grew very little and suffered from anorexia and constipation. There was a trace of albumin; child presented features of infantilism; abdomen still distended and prominent; liver felt two and a half fingers' breadth below costal margin. In hospital two days: Nothing abnormal in urine or faeces: temperature 98° to 98.2° F. June, 1920, to January, 1921: Some symptoms of constipation and anorexia; was away three months at a convalescent home; weight increased to $37\frac{1}{2}$ lb. (average at age, 41 lb.).

Present condition: Bright and intelligent, talks normally; movements normal; small, undersized for age. Infantile characteristics, "little old" face. A remarkable lipomatosis now present, limited to trunk between nipple line and knees, limbs and shoulders not affected; shoulders infantile. Abdomen prominent and distended; liver felt $2\frac{1}{2}$ in. below costal margin, consistence seems normal, nothing felt in abdomen; no definite signs of fluid; heart and lungs normal. Teeth powerfully developed, "spaced." No abnormal hair development. Present height 40 in. (average 44 in.); present weight $37\frac{1}{2}$ lb. Wassermann reaction negative. Habits clean. Urine normal. Bowels regular; usually normal, rarely loose. X-ray: epiphyses negative. Glucose tolerance, and X-ray of skull not investigated.

Summary.—Case defined as infantilism with lipomatosis of limited distribution. Positive diagnosis seems impossible. Thyroid deficiency excluded mainly by absence of any specific features of this save for infantilism. Though lipomatosis suggested distribution seen in suprarenal cortical growth, yet other features, increase of hair and precocity, are absent, and the leading feature is infantilism. Suggested it was possibly a case of hypopituitarism, but further investigation needed.

DISCUSSION.

Dr. F. PARKES WEBER said that the excess of fat in this child was distributed somewhat as it was in fat, middle-aged women; in fact, there was "precocious obesity" present, as in some of the female children with tremor of the suprarenal cortex, about whose cases Bulloch and Sequeira, Leonard Guthrie, and others, had written. In the present case, however, there was apparently no precocity in sexual development.

Dr. PEARSON (in reply) said the case reminded him of hyperlipomata, but its leading feature was the infantilism. In the class of case described by Dr. Weber, was there an abnormal deposit of hair?

Dr. PARKES WEBER (answering Dr. Pearson's question) said that in some of the cases of the class to which he alluded there was hypertrichosis, but he believed that it was not necessarily present.

Section for the Study of Disease in Children.

President—Dr. FREDERICK LANGMEAD.

DISCUSSION ON THE DIAGNOSIS AND TREATMENT OF CONGENITAL SYPHILIS.¹

Sir HUMPHRY ROLLESTON, K.C.B.,

said that in opening a discussion on the diagnosis and treatment of congenital syphilis the ground to be covered was so wide that his remarks must be confined almost entirely to diagnosis, and further, omitting any reference to the more familiar manifestations, he would suggest the following points for consideration.

(A) The limits of the Wassermann reaction as a means of diagnosis.

(B) The influence of congenital syphilis (1) in favouring the onset of other infections; (2) in leading to changes in the endocrine glands and so indirectly to syndromes which were not necessarily specific; (3) in relation to diseases or syndromes which were not generally regarded as due to syphilis and were not obviously secondary to lesions of the endocrine glands.

(A) The Limits of the Wassermann Reaction as a Means of Diagnosis.

The Wassermann reaction was of course of the greatest importance in the diagnosis of congenital syphilis. McIntosh and Fildes [1] pointed out that a positive reaction at birth did not certainly imply the presence of syphilis, since, according to Boas, the reacting substance might have passed from the mother to the child *in utero*; otherwise, with certain exceptions, which hardly came into practical politics, a positive Wassermann reaction indicated the presence of living spirochaetes and the need for antisyphilitic treatment. But the converse did not hold good, for the exceptions were both more numerous and real, and the practical question was in what circumstances should they hesitate to accept a negative Wassermann reaction as evidence that syphilitic infection was absent and that antiluetic treatment was entirely unnecessary? In the first place, it would be remembered that the Wassermann reaction might be negative for some weeks in a new-born infant and then become positive, just as in acquired syphilis the reaction did not become positive until about six weeks after infection. In the second place, the reaction tended to become negative about puberty, and the disappearance of a positive reaction did not mean that the patient's body was free from spirochaetes; Warthin [2] had proved that spirochaetes were present in a considerable proportion of patients with a negative Wassermann reaction during life, and believed that many of these were congenital in origin. At the Bellevue Hospital, New York, Symmers, Darlington, and Bittman [3] found that the Wassermann reaction was negative in 31 to 56 per cent., according to the antigen employed, of cases showing characteristic syphilitic lesions at necropsy; many of these, however, might have been obsolete. To determine in a given case whether

¹ At a meeting of the Section, held February 25, 1921.

a negative Wassermann reaction meant that the infection had entirely died out or was merely latent and not causing the production of antibodies, a provocative injection of neo-salvarsan was often appealed to; and a point on which further information and discussion might be welcomed was how far this test, when the reaction became positive, should be relied on. Was the dose of salvarsan truly provocative, or was the interpretation of a latent Wassermann reaction in some way erroneous? The observations of Strickler, Musson, and Sidlick [4], that intravenous injections of salvarsan into non-syphilitic patients with a previously negative Wassermann reaction were followed in more than half the cases by a positive reaction, suggested that there might be a fallacy in the conception of the provocative dose.

Syphilitic infection after severely damaging an organ might die down or out, and although its past effects were obvious it was no longer the active factor, for the symptoms depended on changes which were now more or less stationary. In such cases if the Wassermann reaction was negative it might be logically argued that antisyphilitic treatment was unnecessary, therapeutic measures being needed to counteract the effect of the lesions originally due to syphilis but now responsible for the dystrophies. The conditions thus referred to were insufficiency of the glands of internal secretion and of the blood-forming organs. But was a negative Wassermann reaction of the blood to be regarded as final evidence that antisyphilitic treatment was quite unnecessary and that the possibility of further activity of spirochaetes, possibly in the endocrine glands already affected, could be ignored? There were cases with the stigmata of congenital syphilis and a negative Wassermann reaction in which dystrophies and other lesions were cured by antisyphilitic treatment.

In an article on congenital syphilis in orthopaedic clinics, Roberts [5] recorded 226 cases of very various kinds, especially arthritis simulating tuberculous infection, all of which presented some evidence of congenital syphilis and responded to antisyphilitic treatment. The Wassermann reaction, however, was carried out in only forty-seven of the bone and joint cases, but negative results were obtained in cases with a positive family history and in some which recovered under mercury and iodide of potassium.

It therefore appeared that at the present time it was impossible to accept as absolute the proposition that in the presence of syphilitic stigmata a negative blood Wassermann eliminated the possibility of existing syphilitic infection.

It was, of course, well recognized, that in cerebro-spinal syphilis the Wassermann though positive in the cerebro-spinal fluid might be negative in the blood; it might be mentioned here that from examination of 214 infants and children with congenital syphilis Jeans [6] had shown that the cerebro-spinal fluid showed evidence of infection of the central nervous system in 33 per cent., or as frequently as in acquired syphilis; but in only one instance was the Wassermann reaction positive in the cerebro-spinal fluid and negative in the blood. It would be interesting to have further information about the Wassermann reaction in the cerebro-spinal fluid, as well as in the blood in cases of syphilitic disease of the pituitary. It seemed reasonable to believe that syphilis of this intracranial endocrine gland might be associated with a positive reaction in the cerebro-spinal fluid and a negative reaction in the blood, and that the syphilitic origin of some cases of pituitary dystrophies, such as Fröhlich's adiposo-genital syndrome, some forms of obesity, gigantism, and diabetes insipidus, might be missed if the blood Wassermann only was investigated.

In dystrophies which might be due, in a secondary and delayed manner, to the effects of syphilis, but might equally be a legacy from the influence of other infections, on the pituitary, thyroid, testes, or other endocrine glands, the presence of a positive Wassermann reaction in the blood would be a very definite indication for antisyphilitic treatment, though it should not put into the background the obvious need for pituitary, thyroid, or some other or combined form of endocrine medication in addition. And in the absence of a positive blood Wassermann reaction the presence of stigmata of congenital syphilis should point to the advisability of antisyphilitic treatment, as was the custom in the pre-Wassermann days. But when there was an absence of these stigmata and the Wassermann reaction in the blood was negative, even after a provocative dose, did this mean that the participation of syphilis could always be so absolutely ruled out that antiluetic treatment was as unnecessary as it might appear to be illogical? Or was it better to take the view that in the absence of any evidence from the history or from physical examination of a past infection of another kind, such as severe enteric, measles, or scarlet fever, antisyphilitic treatment should be tried both with the object of benefiting the patient and as a therapeutic test to determine whether or not syphilis was in some degree responsible for the dystrophy. But it should be borne in mind that this appeal to the therapeutic test was not devoid of fallacy, for quite apart from their antisyphilitic effect the drugs might improve the patient's condition; iodides stimulated the thyroid, and so would counteract hypothyroidism however induced, and arsenic was a powerful tonic, especially to the blood-forming organs.

(B) *The Influence of Syphilis.*

(1) *Congenital Syphilis as a Disposing Factor to other Infections.*—It was important to bear this factor in mind, for otherwise in making a diagnosis the exciting cause—for example, a streptococcal or pneumococcal infection—when established might entirely put into the shade the disposing factor of congenital syphilis. An acute infection falling on a liver with the unicellular cirrhosis of congenital syphilis might imitate acute yellow atrophy. Haemorrhagic disease of new-born infants might probably be due to several infections, and as the treatment by adrenalin was often beneficial, and as the adrenals were usually severely affected in these cases, it was not improbable that there was an acute infective adrenal insufficiency. Infants with congenital syphilis might be attacked—the term syphilis hæmorrhagica neonatorum had indeed been employed—and the adrenals were very frequently—next after the liver, it was stated—invaded by the spirochæte in congenital syphilis. Hence syphilis might reasonably be regarded as a disposing factor. But from its rarity hæmorrhagic disease of the new-born would appear to require some factor other than congenital syphilis, and it seemed probable that this was bacterial infection for which the spirochætal invasion prepared the way. It was not, however, suggested that congenital syphilis usually underlay hæmorrhagic disease of the new-born.

Syphilis, by reducing resistance, paved the way to secondary infections of a chronic character, and so rendered the treatment of the resulting disease more complex. Tuberculosis of lymphatic glands in a syphilitic subject might thus be explained, and perhaps also by the additional factor of hypothyroidism of syphilitic origin. Cases of this mixed infection had possibly often been unconsciously benefited by the old-fashioned application of tincture of iodine. The combination of pulmonary tuberculosis and syphilis concerned the acquired much more than the inherited disease.

(2) *The Influence of Syphilis in leading to Lesions of the Endocrine Glands, and so indirectly to Syndromes which were not necessarily Specific.*—Opinion as to the importance of endocrine infections in the malnutrition, infantilism, and senilism seen in congenital syphilis was gaining ground. It would, indeed, be remarkable if the ductless glands escaped syphilization. In most instances several of them were probably affected, and it must be remembered that when one endocrine gland was damaged the others tended to undergo change, and in the presence of a polyglandular insufficiency an exact diagnosis became more difficult. The adrenals, pituitary, and testes were the endocrine glands most often structurally damaged in congenital syphilis. Addison's disease, however, was very rarely thus caused; though no doubt minor degrees of adrenal insufficiency, or Addisonism as the French called it, as shown by want of vigour and muscular power, low blood pressure, and some pigmentation of the skin, would be not uncommonly noted if specially looked for. The pituitary, which might be invaded by continuity in syphilitic meningitis as well as by haemic infection, appeared to be more often affected in congenital than in acquired syphilis. Fröhlich's adiposo-genital dystrophy, adiposity, diabetes insipidus, and infantilism, might thus be explained; further, it might be pointed out that at a meeting of this Section some four years ago Dr. F. Langmead [7] quoted three recent examples of pituitary insufficiency in congenital syphilis. Hypopituitarism probably also played a part in a number of polyglandular syndromes; but the pituitary was only one of the endocrine glands deficiency of which was concerned with the causation of infantilism.

The condition of the testes in congenital syphilis had recently been investigated by Sir Frederick Mott [8], who strongly suggested that not only might they be invaded by the spirochæme but that chronic spirochætal intoxication might depress their vital energy. Infantilism was common in congenital syphilis, might be associated with juvenile general paralysis of the insane, and was correlated with the disappearance of the interstitial cells of the testes. The thyroid was not so often attacked by congenital syphilis as was the pituitary, and myxœdema was rare in children with congenital syphilis. Slighter degrees of thyroid insufficiency were not so uncommon. In a few instances exophthalmic goitre had been ascribed to disordered thyroid activity caused by congenital syphilis—for example, Hutinel and Stévenin [9] referred to a case improved by injections of perchloride of mercury and adrenalin.

The group of cases of *diabetes insipidus associated with infantilism* might well be regarded as a polyglandular syndrome, the diabetes insipidus being due to insufficiency of the pars intermedia and posterior lobe of the pituitary, and the infantilism either to the same lesion or to damage done to the interstitial cells of the testis, or possibly to implication of other endocrine glands. The occurrence of diabetes insipidus as a result of syphilis was well known, and its improvement after antisymphilitic treatment had been recorded (Schulmann and Desoutter) [10]. It would be interesting to know what proportion of the cases of pluriglandular insufficiency causing diabetes insipidus and infantilism were due to congenital syphilis. As Parkes Weber [11] pointed out, two groups of polyuria in children might be recognized, viz., (1) diabetes insipidus (without renal disease) associated with infantilism, which was less rare than (2) polyuria due to chronic interstitial nephritis with some degree of infantilism (more recently called renal dwarfism).

Obesity of endocrine origin was a complicated problem, for it might be associated with insufficiency of several individual glands or be pluriglandular

in origin. Fröhlich's adiposo-genital dystrophy had been referred to as a manifestation of hypopituitarism, thyroid obesity was familiar, and so also was that due to insufficiency of the genital glands. Cushing [12] in 1912 considered the hypopituitary form to be the most frequent. These insufficiencies might be due to various factors, and among the infections congenital syphilis must be remembered. Lipodystrophia progressiva was thought to be an endocrine affection (F. P. Weber [13]), but except that thyroid medication had proved unsuccessful, and that it mainly attacked females, there did not appear to be any evidence as to the glands involved. In the twenty-one cases quoted by Parkes Weber the Wassermann reaction was mentioned in one instance only, in the daughter of a syphilitic father, and then was negative.

Another problem of even greater difficulty was how far, if at all, by impairing the activity of those endocrine glands—the pituitary thyroid, parathyroid, and the thymus—that influenced skeletal growth, congenital syphilis might be responsible for certain obscure diseases of bone, such as achondroplasia, osteogenesis imperfecta, oxycephaly, and cleido-cranial dysostosis. For in the first place there is but little proof that in these diseases the skeletal changes depended on endocrine disorder, though Baumel and Margarot [14] suggested that the first two were due to partial insufficiency of the anterior lobe of the pituitary; and in the second place, the association of these diseases with congenital syphilis had been very seldom noted. Although the pancreas might show a diffuse syphilitic infiltration in congenital syphilis, it was remarkable that diabetes mellitus was extremely seldom, if ever, established as a sequel. It was true that the islands of Langerhans were not involved, but it would not have been surprising had they subsequently become affected. It had been urged by Hutinel that endocrine disorders due to syphilis in one generation might lead to dystrophies in the next generation, but in this event it would appear that syphilitic infection was not necessarily transmitted as well, and antisyphilitic treatment was therefore not required.

(3) *The Influence of Congenital Syphilis in Relation to Various Diseases which were not generally regarded as due to Syphilis, and were not obviously due to Lesions of the Endocrine Glands.*—The consideration of the diseases in this group chiefly bore on the estimation of the wide influence of syphilis and the need for early and preventive treatment, for though antisyphilitic treatment of the conditions when established might prevent further progress, a cure was beyond expectation.

Chronic Interstitial Nephritis in Early Life.—In pre-Wassermann days this condition had been thought to be more closely related to congenital syphilis than it was now, though it had never been regarded as solely due to this cause. Guthrie [15] (1897), Payne [16] (1900), and Sawyer [17] (1906), all supported the view that congenital syphilis was a cause of chronic interstitial nephritis. Nettleship [18] had pointed out that both interstitial keratitis and chronic interstitial nephritis were commoner in girls than in boys, whereas taking 130 cases of chronic parenchymatous nephritis under the age of 13 years the incidence in boys (54 per cent.) was only slightly higher than in girls (46 per cent.); he (Nettleship) therefore raised the question whether the female excess of chronic interstitial nephritis could be due to a larger number of girls born with syphilis. There were several ways in which congenital syphilis might be thought to lead to chronic interstitial nephritis: (a) The diffuse small-celled infiltration might either advance to fibrosis or while disappearing leave behind a diminished resistance which, as in the case of the liver, would enable other factors to act at a great advantage in inducing interstitial change. (b) The widespread

arterial change due to congenital syphilis, which in extreme cases might obliterate the pulse in the limbs, might produce an arterio-sclerotic kidney. (c) Indirectly, by damaging the thyroid and possibly other glands of internal secretion, congenital syphilis might, after it had died out so that the Wassermann reaction had become negative, cause so much metabolic disturbance as to lead to chronic interstitial nephritis. This was perhaps rather a vague and speculative pathology, but it seemed to have a bearing on the cases of renal infantilism or dwarfism associated with bony changes described by Morley Fletcher [19], Miller [20], Parsons [21], Barber [22], D. H. Paterson [23], and others. In these cases the Wassermann reaction in the blood was negative and so syphilis could not logically be incriminated; it was, however, possible that in some instances it might indirectly, as suggested above, have been the starting point of the renal and bone lesions, mainly through its effects on the thyroid, parathyroids, and pituitary, and of the infantilism, partly at any rate, by changes in the interstitial cells of the testes.

If there was any reason to regard a case of renal disease as syphilitic, mercurial treatment, should, if employed at all, be very carefully watched, as it was often badly borne; it was indeed recommended that salvarsan preparations should be used instead.

Multilobular or *portal cirrhosis* in young children might no doubt be due to various causes other than syphilis. In the familial disease progressive lenticular degeneration S. A. K. Wilson rejected syphilis, though Homén and Yokoyama and Fischer took the opposite view. Other cases might be due to the poisons of infectious diseases, or to dietetic errors or precocious alcoholism. There certainly were cases of children with stigmata of congenital syphilis whose livers showed ordinary portal cirrhosis, and in these the view might be taken that the diffuse intercellular cirrhosis had disappeared, but left behind it some vulnerability or diminished resistance of the liver, so that factors causing cirrhosis would readily produce this effect. In other words, that the cirrhosis was *parasyphilitic* in the sense that *tabes* and general paralysis of the insane were thought to be until they were shown to be due to the presence of spirochaetes and examples of parenchymatous syphilis. He did not know of any demonstration of the *Spirochaeta pallida* in the liver of portal cirrhosis in children, and the question arose whether or not in the absence of a positive Wassermann reaction in the blood antisiphilitic treatment was advisable. There were two minor arguments in favour of adopting this course: (1) since the advent of the Wassermann reaction the high incidence of a positive result in the cirrhosis of adults had suggested that ordinary portal cirrhosis might be a result of syphilitic infection (Symmers [24], Letulle); and (2) that in the past a number of cases regarded as cirrhosis had recovered after antisiphilitic treatment. Although this result was often regarded as evidence that the diagnosis of cirrhosis was wrong and that there really was gummatous disease of the liver, it was possible that the treatment arrested the progress of a true syphilitic portal cirrhosis. Hanot's hypertrophic biliary cirrhosis was so rare that its existence, apart from aberrant forms of portal cirrhosis, had aroused a good deal of criticism. Congenital syphilitic disease of the liver and spleen could undoubtedly imitate its clinical manifestations, but a question for discussion was whether by symbiosis or merely by weakening the vital resistance congenital syphilis might be responsible for some of the cases.

Chronic Peritonitis.—Just as Letulle [25] brought forward evidence, mainly from a positive Wassermann reaction, that chronic peritonitis was frequently due to acquired syphilis, so Castex and Del Valle [26] argued that

chronic pericolitis with adhesions and peri-enteritis causing chronic abdominal symptoms or the condition described by Lane, Jackson, and Wilms was a late result of congenital syphilis, and they reported cases responding to anti-syphilitic treatment mainly by mercury. The pathogeny was described as complex and due to several factors; there might be defects in the intestinal walls, developmental and due to endocrine glands, especially the thyroid, and in addition the adrenals damaged by syphilis, and further, the endocrine defects might through the nervous system cause intestinal stasis and so colitis and pericolitis. Syphilis was previously regarded by the French school as a factor in the aetiology of chronic perivisceritis.

Anæmia.—By its effect on the blood-forming organs, in addition to its apparently hæmolytic influence, syphilis was a potent cause of anæmia in early life, and probably many forms may thus be produced. Syphilis, however, should be regarded as one only of the factors in infantile anæmia and not as an exclusive cause of any form. Hutinel and Stévenin regarded von Jaksch's anæmia pseudo-leukæmica infantum as usually, if not entirely, due to congenital syphilis, but this view would appear to be extreme. In a few cases congenital hæmolytic jaundice was associated with syphilis, and a causal relation was suggested by the known association of paroxysmal hæmoglobinuria and syphilis.

Mitral stenosis had been thought to be a malformation due to the influence of congenital syphilis, but it might also be argued that it was due to chronic endocarditis comparable to the obliterating endarteritis sometimes seen to an extreme degree in late congenital syphilis. Cowan and Fleming [27] had made out a good case for the syphilitic origin of, at any rate, some examples of combined mitral stenosis and granular kidneys. Queyrat [28] described absence of the xiphoid appendix of the sternum as a sign of congenital syphilis and noted its frequent association with pure mitral stenosis.

Rickets.—Parrot's view that rickets was entirely due to congenital syphilis had never been accepted in this country, and at the present time was particularly, in the light of work on vitamins, unlikely to receive support; but in France it had been sustained with modifications. A. Fournier regarded rickets as a parasymphilitic affection and disposed to by syphilis, and Marfan considered that syphilis was a factor but not an exclusive factor, and gave the following characteristics of syphilitic rickets: (1) onset within four months of birth; (2) prominence of the cranial lesions, craniotabes, natiform skull, dilated veins; (3) well-marked anæmia; (4) chronic splenic enlargement. Hutinel and Stévenin associated severe rickets accompanied by anæmia with syphilis, and brought in endocrine affections as the connecting link between congenital syphilis and rickets. Thus, syphilis, by its influence on the endocrine glands and the viscera, modified nutrition, damaged the skeleton, and sensitized the bones to the true exciting factors of rickets.

Congenital malformations might occur in the subjects of congenital syphilis, and the question arose how far the intra-uterine activity of congenital syphilis was a cause of these defects. That it was not an exclusive cause everyone would agree, but it was possible that in this country the causal factor of congenital syphilis had been underestimated. Edmond Fournier [29] described a large number of malformations in congenital syphilis.

For the important subject of *treatment* there was room for much expression of personal experience: for example on the questions whether in the early stages mercurial inunction and its oral administration, as in the past, was as efficient as the combined treatment with salvarsan preparations: whether the

salvarsan should be given into the veins of the scalp as Noegerrath (1912) and in this country L. Findlay [30] (1915) first advocated, into other veins such as the jugular, or whether the original plan of deep intramuscular injections, recently revived in America (Fordyce and Rosen) [31], was the most convenient and effective. Presumably the neo- ("914") preparations were from the point of view of administration more suitable than the original ("606") preparation—but were they more effective and not attended by greater risk of toxic effects? With regard to ante-natal treatment the merits of salvarsan and mercurial treatment would probably be answered with Findlay and Robertson in favour of the former.

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MR. O. L. ADDISON

said that the manifestations of congenital syphilis which came within the province of the surgeon were on the whole less desolating than those with which physicians had to deal, for surgeons were spared the contemplation of the assaults made by the disease upon the central nervous system. Still the surgical lesions were sufficiently grave, and since they were peculiarly amenable to treatment if identified in time it was not necessary to labour the importance of early diagnosis. The chief factor in successful diagnosis of most diseases was to be on the watch for them, for only so could one penetrate their manifold disguises, and it was a commonplace that syphilis was the most efficient masquerader of them all. Once suspected, the diagnosis, in the forms of syphilis with which he had to deal, could be decided by the results of treatment, with or without the help of the Wassermann reaction.

He proposed to describe briefly the features of congenital syphilis as he had met it in a fairly large experience, but it was obviously impossible to give more than the briefest outline on an occasion like this. As far as rarities went, he would be content with insisting again that one could be too suspicious of lesions, which however variegated and anomalous, could conceivably be credited to a chronic inflammation.

At the present day they seldom saw the severer manifestations of the disease except in infancy; Hutchinson's triad, i.e., notched teeth, deafness and interstitial keratitis was a rarity, and it was much more usual for the lesion

for which treatment was sought to be the only obvious sign of the disease. With the present system of ante-natal treatment, there was every hope that the syphilitic infant too would soon be a rarity.

There seemed to be no limit to the age up to which symptoms might continue to appear; at the present moment he had a patient, aged 20, with old thickening of the tibiae, who had just developed a gumma in the muscles of the leg, and interstitial keratitis.

For descriptive purposes it was advisable to consider the manifestations of congenital syphilis in relation with two age-periods, viz.: (I) Infancy, and (II) after infancy.

(I) Infancy.

If they excepted "snuffles" there was only one common surgical lesion of congenital syphilis during infancy, viz., osteomyelitis of the long bones. It was seen most often at about 3 months of age, and started as a periostitis, rapidly becoming an osteomyelitis, and affecting as a rule all the long bones of the arms and legs. The condition was generally more advanced in the arms than in the legs. X-ray photographs were quite characteristic. In the milder degrees they showed the periosteum raised from the shaft by a deposit of new bone. More advanced cases showed in addition large areas of absorption most marked at the ends of the diaphysis. Mild degrees of this osteomyelitis did not give rise to obvious symptoms, but he believed it was an almost constant feature of infantile congenital syphilis, and he had frequently had X-rays taken in doubtfully syphilitic cases for the purpose of confirming the diagnosis. In advanced cases fractures were frequent. Owing to the absence of pain and swelling in the earlier stages, it was only the advanced cases which were recognized, and then under the entirely misleading name of "epiphysitis." The reason for this name was that changes were most advanced at the ends of the diaphysis, and consequently it was here that the tenderness and swelling were most marked. The child naturally refrained from use of any muscles attached to the inflamed periosteum and a "pseudoparesis" resulted. Later, effusion into the joint occurred, with or without a secondary infection, and separation of the epiphysis was not infrequent. He had not seen syphilitic arthritis in infants unassociated with osteomyelitis. Bending of the bone due to softening was said to occur, but he had not seen any instance of this, though fractures were quite common and might cause deformity.

Osteomyelitis of Infancy.—Little or no difficulty about the diagnosis of these cases if X-rays were taken. There was no other disease that he had met giving these appearances in all the long bones. Diagnosis had to be made from:—

(1) *Periostitis and osteomyelitis of other origin, e.g., staphylococcus, pneumococcus, tubercle, &c.*—These were all extremely rare at the age when syphilitic osteomyelitis was most common, i.e., 3 to 4 months, and never did they affect all the long bones. The diagnosis was obvious from the X-ray alone.

(2) *Scurvy.*—Here the age of child, seldom under a year, and other obvious signs of scurvy were sufficient.

(3) *Poliomyelitis* might be mistaken for the advanced stage of pseudoparesis, but again an X-ray of the long bones settled the question.

(4) *Acute infective arthritis*, most often pneumococcal, but might be due to almost any organism, even coli or meningococcus. These might be differentiated readily from the syphilitic cases by the X-ray evidence of osteomyelitis in the latter, but it had to be remembered that it was quite usual for a secondary infection to occur in the syphilitic cases.

Cases of renal insufficiency associated with multiple fractures, as recently described before this Section by Dr. D. H. Paterson, showed X-ray appearances not unlike late quiescent cases of syphilitic osteomyelitis, but the presence of albumin in the urine and a negative Wassermann reaction would reveal the correct diagnosis.

Dactylitis was extremely rare: he had only seen one or two instances.

The next infant lesion in order of frequency was orchitis. This was common at birth or in the first month or so, and appeared as a hard painless enlargement usually symmetrical, and accompanied by a small hydrocele. A few cases of broken down gummata of the testicle had been recorded, the earliest at the age of 9 weeks. He knew of no other condition for which this could be mistaken. Tubercle of the testis occurred at a later age.

(II) *After Infancy.*

In the second period, viz., after infancy, bone and joint affections were still the most frequent manifestations. There were two forms of bone involvement, periostitis and osteomyelitis.

Periostitis occurred at 3 to 4 years or later and was either diffuse or localized, the diffuse form giving rise to the well known sabre tibia, the localized form to nodes; both were commonest on the tibia, but might occur on other long bones, and the node not uncommonly on the cranial bones and vertebræ. The diffuse form rarely broke down, whereas the node commonly did. Both forms led to the formation of a large quantity of sclerosed bone except in the cranium and vertebræ.

General osteomyelitis affecting a part, or the whole length, of one or more long bones was much less common. It gave rise to an enormous general increase in amount and density of the compact bone, with areas of softening and formation of sequestra in the medulla. Later, sinuses formed and the condition clinically was indistinguishable from a chronic osteomyelitis of staphylococcal or other origin. Overgrowth in length and bending might occur, or shortening if the epiphyseal cartilage was involved.

Diffuse Periostitis.—The perfectly smooth even deposit of new dense periosteal bone seen in this form was unlike any other condition that he knew of. There was no excuse for mistaking the rickety tibia for syphilitic periostitis.

Local Periostitis.—In long bones: This might occur anywhere in the length of a long bone usually near one or other end of the diaphysis; a greenstick fracture without bending or a simple traumatic periostitis might be mistaken clinically for an early stage. In more advanced cases there was often very great enlargement of the bone and a diagnosis of sarcoma was frequently made on clinical grounds, but an X-ray showing the often enormous formation of dense bone would settle the question. From an enlargement due to tuberculous abscess or osteomyelitis an X-ray again was conclusive, for in tubercle rarefaction and absorption with very little new formation or sclerosis of bone were the usual events. Many of these syphilitic cases had been described as a hypertrophic form of tuberculosis of bone. Localized periostitis of the cranial bones was frequent and often indistinguishable clinically from sarcoma or tubercle, though the latter was extremely rare.

Osteomyelitis.—From the local forms tubercle or sarcoma might be indistinguishable clinically, but again an X-ray was conclusive. From a chronic abscess of bone due to staphylococcus, &c., even an X-ray might not give conclusive evidence.

Diffuse Syphilitic Osteomyelitis.—In this type the onset was never so acute as in the more common forms due to staphylococcus, &c., but certain diagnosis could seldom be made on clinical or X-ray evidence and reliance must be placed on the presence of other signs of syphilis, the Wassermann reaction, and the results of treatment.

Joint lesions were of three types: two common, gummatous synovitis and symmetrical serous effusion; and one very rare, chondro-arthritis.

Gummatous synovitis was seldom recognized, as it was indistinguishable clinically from tubercle. In both muscular spasm and wasting were present, and it was commonly unassociated with other signs of congenital syphilis. Another point of resemblance to tubercle lay in the fact that the joint might recover with simple splinting. The points of difference in these cases from those of tuberculous joint consisted in considerable overgrowth, and in perfect recovery of movement shortly after removal of the splints. In gummatous synovitis X-rays frequently showed a layer of new periosteal bone at the end of the adjacent bones. This condition was usually monarticular, and might affect any of the larger joints.

Symmetrical serous effusion (Clutton's joints) most commonly affected the knee-joints. The condition was usually much more marked in one of the joints, the other frequently escaping the parents' notice. There was considerable effusion, and a variable amount of synovial thickening. The symptoms were slight, little or no pain being felt except after prolonged use. Muscular spasm was absent, wasting slight, and the movements were free except for mechanical limitations. Chondro-arthritis was rare, and one of the later manifestations was characterized by effusion, by thinning and ulceration of cartilage, and erosion of the underlying bone. The synovial membrane was thickened and fringed. Several joints were affected. Still described another type, with much limitation of movement and no effusion, closely simulating a rheumatoid arthritis.

Other rarer lesions attaching to this age were the following:—

(1) Gummata in muscles, often reaching a large size. Gummata of the skin and subcutaneous tissues, unassociated with underlying disease of bone, were very rare, but cases with extensive destruction of the lips and nose had been recorded. He had seen one case of multiple gummatous ulceration of the skin and one or two of rupia. As a rule the so-called cutaneous gumma was a tuberculide. Diagnosis from any chronic inflammatory mass might be impossible clinically and recourse must be had to the Wassermann reaction and if necessary to exploratory operation, or to a bacteriological or a microscopic examination. Sarcomata might generally be diagnosed by their better definition, though a diagnosis might be impossible without an exploratory operation.

(2) Ulceration of the hard or soft palate, and glossitis, were not uncommon.

(3) Chronic enlargement of the glands of the neck, often forming a mass of considerable size and indistinguishable clinically from enlarged glands due to tubercle or to any other chronic inflammation, was fairly frequent.

Diagnosis, in the presence of the commonly accepted signs of congenital syphilis, viz., depressed nose, Hutchinson's teeth, interstitial keratitis, &c., was simple and the diagnosis of any given lesion had only to be suspected to be immediately confirmed. Unfortunately many of these cases showed no clinical signs other than the lesion for which treatment was sought, and these lesions so exactly imitated those of other and more common diseases that the correct

diagnosis was not thought of. The most striking example of this mistake in his experience was gummatous arthritis: in these cases other clinical signs of syphilis were usually wanting and a diagnosis of tubercle was almost invariable. Unless a Wassermann reaction was done as a routine in all cases of suspected tubercle of joints and spines the majority of these cases would be missed. Congenital syphilis could and did imitate exactly nearly all the surgical lesions of tubercle and to his mind this was responsible for the statements seen in the older text-books that the association of the two diseases was very common. He had only had one case in which he was able to prove the presence of both syphilis and tubercle. In doubtful cases diagnosis could only be made on the Wassermann reaction and the results of treatment.

Treatment.—He would say very little, and nothing detailed, about the treatment, for that would be dealt with fully by Dr. Nabarro who had given the general treatment in a large number of his cases.

But he considered constitutional treatment was all-important and he was a strong believer in a course or courses of intravenous or intramuscular injections of novarsenobillon with the prolonged use of mercury. Of the two drugs he believed mercury to be of the far greater value but courses of the drug must be given over a period of many years. He preferred to use it in the form of ung. hydrarg. and lanoline, equal parts. With this he used to get excellent results before the days of novarsenobillon.

He had not yet known of a child with a Wassermann reaction originally positive becoming negative as a result of treatment and remaining so permanently. It was possible, and he thought likely, that in some cases the virus did die out, but seeing that latent periods with entire absence of symptoms might last for thirty to forty years, how could they say that a patient was cured even if the Wassermann reaction remained negative for nine or ten years?

Sir FREDERICK MOTT, F.R.S.,

said that after hearing Sir Humphry Rolleston's address he was reminded of what Sir William Osler said at the Royal Commission: that he (Sir William) thought he could teach medicine on syphilis. It seemed that Sir Humphry Rolleston could do so too. But there was one disease which Sir Humphry had not touched upon—a disease of which he (Sir Frederick Mott) had had considerable experience—namely, juvenile general paralysis and tabo-paralysis. When he was appointed to the London County Council, he was convinced that syphilis was the cause of general paralysis, not alcohol and sexual excess and the other conditions which had been alleged as such; and he had felt that the only way to find out whether it was so, or not, was to collect cases of juvenile general paralysis and demonstrate the fact that they were syphilitic. In forty cases which he had collected, about half showed definite signs of congenital syphilis on the body. Quite half showed no signs on the body exteriorly. Some cases showed syphilitic changes in the viscera, e.g., syphilitic liver. A specific family history was discovered in the majority of cases. He would throw on the screen some lantern slides to illustrate these cases of juvenile general paralysis.

The first slide showed a boy, who came to Charing Cross Hospital at the age of 8 years; he had squint and a gummatous node on his arm: he had also Hutchinsonian teeth, and rhagades around the mouth. Eight years later he was in Colney Hatch Asylum. There was a definite history of syphilis in

the mother. This picture showed him at 16 years of age, and he looked about 9 years, with an infantile sexual development; there was no hair on the pubes. He died, and the characteristic signs of general paralysis in the brain had been found. Unfortunately, they did not know much about the pituitary body at that date, and he (Sir Frederick Mott) did not look at it; but he did examine the testes. These had the histological appearances of the testes at birth, except that the interstitial cells of Leydig were not discoverable. It must be assumed that this absence was related to the absence of the secondary sexual characters and the infantilism.

Here was a photograph of some interesting cases; they were all syphilitics and imbeciles or juvenile general paralytics.

Recently he had examined the testes of a large number of patients who had died in asylums. In a case of tabo-paralysis in which there was no infantilism, he had obtained the seminal fluid from the vesiculæ seminales, and the spermatozoa were found to be actually alive, and when examined by dark-ground illumination could be seen under the microscope moving about.

The diagram he would next show on the screen gave some of the family histories of cases of juvenile general paralysis. Some of these were interesting because they showed miscarriages, abortions and deaths in early infancy, then at puberty the juvenile general paralytic appeared. This rather suggested an attenuation of the virulence of the spirochæte by the action of antibodies in the mother, and it was somewhat against the idea which had recently been put forward in Paris by Marie and Levaditi that the specific organism of this disease was neurotrophic as distinct from a dermatrophic organism. Certainly it was but rarely one found skin eruptions in general paralysis. That the organism was attenuated, had been shown by Forster and Tomaszewski who removed portions of the brains of paralytics during life and who having found spirochætes in the material, unsuccessfully tried to infect monkeys with it.

With regard to the infection of the pituitary body, there was no doubt that spirochætes were in the brain in every case when the cerebro-spinal fluid gave a positive reaction; he had found them in the brain substance in sixty-six out of one hundred successive cases of general paralysis, but he had never seen them in the pituitary body in the few cases which he had examined. In these cases of general paralysis he had not found the spirochæte in fifty successive examinations of the testes. This accorded with the fact that a general paralytic might have healthy children if he had not infected his wife.

(A number of lantern slides were shown to illustrate the condition of the testes in the infantile and non-infantile types.)

Dr. LEONARD FINDLAY (Glasgow)

said that when the known ætiological factor of a disease was of the nature of an organism, the only sure way to make a correct diagnosis was by finding the particular organism, and such was their stand-by in diphtheria, typhoid fever and tuberculosis. Unfortunately in syphilis the search after the spirochæte was only likely to be attended with success in the case of the primary sore, and thus was of little help so far as congenital syphilis was concerned, except of course in the case of the dead born fœtus.

The Value of the Wassermann Reaction.

Fortunately there was the biological test, the *Wassermann reaction*, and as a result of prolonged experience with this test he had come to regard it, when properly carried out, as of inestimable value, and in the face of a negative result would desire very strong clinical proof that the case was syphilitic in nature.

In order the better to focus the reasons for his belief in the value of the test he had analysed over 1,000 *Wassermann* reactions performed for him by Dr. R. M. Buchanan, of the Health Department of the city of Glasgow. Dr. Buchanan had practised during this period the original *Wassermann* technique, using cholesterolized human heart as antigen, and he considered as definitely positive all sera which deviated more than four minimal hæmolytic doses of complement.

He would consider, in the first place, the cases of infants in which there might be a question of early syphilis, cutaneous or visceral, and either from notes made by himself at the time of examination, or from the records of his assistants, he had divided these cases into four groups:—

- (1) Definite syphilis.
- (2) ? Positive syphilis.
- (3) ? Negative syphilis.
- (4) Definitely not syphilis.

The first group consisted of cases presenting typical cutaneous and mucous membrane, bone or visceral lesions. The second group included the cases in which the skin and visceral lesions were anomalous or indefinite, and in which one did not feel inclined to swear to the syphilitic nature of the mischief. The third group included the cases in which the symptoms were still less definite than in the second group, but in which the history was suspicious; and the fourth group comprised different varieties of skin disease, e.g., seborrhœic dermatitis, impetigo, simple pemphigus, urticaria, napkin rashes or excoriation of the buttocks and genitals from urine and fæces—conditions which were submitted as probable syphilis, but in which he or his assistants had felt it possible to definitely eliminate this disease.

TABLE I.

No.	Nature of lesion	Wassermann reaction		Percentage with + Wassermann reaction
		+	-	
1	Definite congenital syphilis	161	2	98
2	? + congenital syphilis	31	10	75
3	? - congenital syphilis	11	40	21
4	Definitely not syphilis	0	58	0

In striking agreement with the above were the results obtained in the mothers of definitely syphilitic and non-syphilitic children.

TABLE II.

	Wassermann reaction		Percentage with + Wassermann reaction
	+	-	
Mothers of syphilitic infants	76	10	88
Mothers of non-syphilitic infants	0	17	0

Of the ten mothers of syphilitic infants in whom the reaction was negative, the child was 7 weeks old in one case, 5 months old in another, 6 months old in two cases, 1 year 4 months, 1 year 5 months, and 1 year 6 months, in three other instances.

He had had the *Wassermann* reaction performed in many different patho-

logical conditions, some of which were of unknown origin but in which it had been suggested that lues might play a part, while others again were conditions which they knew not infrequently possessed a syphilitic basis—e.g., cirrhosis of the liver, aortic disease, mental deficiency and spinal sclerosis. It was interesting to contrast the results obtained in these two types of diseases—the occasional presence of a positive Wassermann reaction in the one group and its habitual absence in the other (Table III). Spastic diplegia, hydrocephalus, epilepsy, mental deficiency and congenital heart disease, though all occasionally due to syphilis, did not seem, as a result of more extended experience, to be so frequently of this origin as he at one time supposed. In his last series of cases of frank congenital heart disease he had not obtained a single positive reaction, but in two infants dying from very severe visceral syphilis, the sole cardiac abnormality that had been found post-mortem was a widely patent ductus arteriosus. This was a point of no little interest in view of the effect of syphilis on the muscle of the vessel wall, and the part which this played in the closure of the duct.

TABLE III.

	Wassermann reaction				Wassermann reaction		
	+	...	-		+	...	-
Mental deficiency ...	4	...	37	Poliomyelitis ...	0	...	5
Mongol ...	1	...	6	Friedreich's ataxia ...	0	...	1
Hydrocephalus ...	4	...	37	Microcephaly ...	0	...	3
Epilepsy ...	1	...	9	Oxycephaly ...	0	...	1
Lateral sclerosis ...	2	...	0	Obliteration of bile ducts ...	0	...	9
Cerebral tumour ...	1	...	14	Congenital heart disease ...	0	...	13
Spastic diplegia ...	1	...	17	Splenic anemia ...	2	...	18
Meningitis ...	1	...	13	Marasmus ...	1	...	13
Encephalitis ...	0	...	12				

Special attention should be drawn to the cases of marasmus, a condition which was said by many to be not infrequently the sole manifestation of syphilis. For such a view he did not consider that there was any adequate evidence. The one positive case in his series was an illegitimate child, and this fact detracted very considerably from the value of even one positive Wassermann reaction in fourteen. One had a difficulty in understanding how the syphilitic process should be so severe as profoundly to alter the state of the child's nutrition and yet fail to induce the usual serological changes, and moreover it would be very curious if it were only in the anomalous forms of the syphilitic infection that the Wassermann reaction was negative.

The Frequency of Congenital Syphilis.

He had thought that when he came to analyse his results it would have been possible to come to a decision regarding the frequency of syphilis among the hospital infant and child population. Unfortunately, however, the Wassermann reaction had not been performed in many of the definitely syphilitic children, and thus any figures that he could quote would not be complete. He had, nevertheless, obtained the general impression that congenital syphilis was nothing like so common as was frequently stated. The only feasible way of obtaining an estimate of the prevalence of the disease would be to perform a serological test in the case of all children admitted to the out-door department and wards of a children's hospital, and this, so far as he was aware, had only been done to a small extent by several workers in America. They had obtained a positive reaction in 2 to 4 per cent. of the cases, but, be it

noted, even this incidence referred only to the sick children and to the sick children of one class of society.

A word of warning was needed regarding a method of solving this problem which had lately become habitual in some maternity hospitals, namely, the examination of the umbilical blood. A positive reaction obtained with umbilical blood did not necessarily mean that syphilis would develop in the child, and he did not consider it *per se* an indication for antisyphilitic treatment. The substances causing the Wassermann reaction might pass over into the child and cause a positive reaction though there had been no passage of spirochaetes and, therefore no syphilitic infection. Such a reaction in the child would, however, be evanescent and soon disappear. This fallacy had recently been brought home to him in the case of a child born after ante-natal treatment with neokharsivan and mercury. The mother, who yielded a strongly positive reaction, was given four injections of neokharsivan in addition to mercurial inunction during the eighth and ninth months of pregnancy. The pathologist at the maternity hospital examined the umbilical blood and obtained a very definitely positive result, and then referred the case back to them as a failure of ante-natal treatment. The infant was examined by them at the age of 1 month and again at 3 months when it presented absolutely nothing suggestive of syphilis, and gave a negative reaction, and that in face of the fact that no post-natal antisyphilitic treatment had been carried out. At the age of three months the blood was also examined by the pathologist of the maternity hospital and this time he obtained a negative result. As would be stated later he had not as yet seen a failure of ante-natal treatment when instituted before the ninth month of pregnancy, even although it had not invariably been possible to obtain in the mother a definitely negative reaction.

Value of Negative Wassermann Reaction.

He quite appreciated the fact that the Wassermann reaction was not a specific test in the aetiological sense, being probably of a quantitative and not of a qualitative nature, and would therefore have been prepared for a certain amount of discrepancy between the serological and clinical findings. Such discrepancies were, however, negligible, and he therefore entirely agreed with the findings of the Medical Research Committee, and concluded that a positive Wassermann reaction, at least in this country, was proof of a syphilitic infection, and in its absence he desired very definite evidence that the diseased condition from which a child was suffering was syphilitic in nature. The test in fact was more frequently in agreement with the pathological lesions than either the "Widal" in the case of enteric fever, or the finding of the tubercle bacillus in the sputum in the case of phthisis pulmonalis.

If then a positive reaction spelt syphilis, conversely a negative reaction, he held, statistically meant freedom from the disease. This opinion was borne out by the overwhelming proportion of cases of the disease reacting positively, its presence as the only evidence of the disease in the latent varieties, the frequency with which second and third attacks of the disease were nowadays met with after the injection of salvarsan and the induction of a negative reaction, and its regular absence in diseases definitely not syphilis. The Wassermann reaction was undoubtedly the most delicate test for detecting the presence of the disease, and persisted long after the symptoms had disappeared. It should be, and in reality was, the best criterion of their

treatment, and in the light of this test it was therefore interesting to gauge the efficacy of the different methods of treatment of congenital syphilis as practised to-day. Of course it was not asserted that a negative Wassermann reaction and complete destruction of spirochaetes in the body were necessarily synonymous.

Treatment by Mercury Alone.

Treatment by mercury alone was of course condemned. Before the use of salvarsan his mortality-rate for children under 3 months of age was 71 per cent., a rate not exceptional, but recorded by other workers in various parts of the world.

Treatment with Salvarsan and Mercury—Post-natal.

With the advent of salvarsan and its application along with mercury in the treatment of congenital syphilis, a great reduction in the mortality-rate was obtained. In the early days his mortality-rate, for the children under 3 months old, was reduced to 37 per cent., and later to 26 per cent., a considerable improvement on the 71 per cent. mortality of the pre-salvarsan days.

The lowering of the mortality-rate, however, was one thing and the cure of the disease another. By cure he meant a disappearance of the symptoms with a negative and persistently negative Wassermann reaction.

For the purpose of the present discussion he had selected the last series of cases treated in his department by himself or by his assistants, and had divided them into two groups, one comprising the children under 1 year of age and the other group the children over 1 year of age.

(1) Of thirty-seven children under 1 year of age a negative Wassermann reaction had been obtained in 64 per cent. of the cases after a course of nine or fewer injections, but in three—i.e., 8 per cent., at least as evidenced by the persistence of a positive Wassermann reaction, a cure had not been obtained even after fourteen injections.

(2) Of the children over 1 year of age (twenty in number) ten had been cured with fourteen or fewer injections, but ten had continued to give a positive Wassermann reaction even after as many as twenty-one injections—i.e., in 50 per cent. of the children a cure had not been obtained. In all of the cases nevertheless the clinical manifestations had been relieved or had entirely disappeared. This group of cases was composed of children in whom the mischief had remained latent for many years with the development later of osteitis, condyloma or eczema oris.

The necessity of administering salvarsan or kharsivan intravenously had undoubtedly hindered the general use of these drugs, but fortunately there was now on the market a preparation—sulfarsenol—which could be given intramuscularly without causing pain, induration or sloughing, and which, judging from an experience as yet limited, seemed to be quite as efficient as its precursors. If, however, the dosage recommended by the makers was used the disappearance of the symptoms was very slow, and they had lately adopted the practice of giving it in the same doses employed for neokharsivan, and so far without any untoward results. In their first series of five cases a negative Wassermann reaction was obtained in four with six to eight injections.

Ante-natal Treatment.

The results of post-natal treatment above quoted, viz., the inability to obtain a cure in 8 per cent. of the children under 1 year and in 50 per cent. of the children over 1 year of age, were however such that no one could rest satisfied with them. They contrasted very sharply with the results of intra-uterine or ante-natal treatment, a form of treatment which had produced good results in the hands of the French, which had given him 100 per cent. of healthy children, and which had been brought more recently to the notice of the profession by Adams.

His experience with ante-natal treatment was limited to fifteen families, but as already mentioned, he had been successful in every instance in ensuring the birth of a healthy and non-syphilitic infant. But perhaps the most striking feature of this treatment was that not only was the child born immediately after the course of treatment healthy, but that these women continued to bear non-syphilitic offspring in spite of the fact that no further antisyphilitic treatment had been undertaken. He had observed several of his patients pass through three successive pregnancies, terminating in each case with the birth of a healthy child. Fortunately, too, he had been able to keep in touch with most of the families, and had thus had opportunities of examining the children subsequently. Not one of them, to his knowledge, had ever presented any manifestations of syphilis, and all, whenever examined, in one case at the age of 7 years, gave a definitely negative Wassermann reaction. This clearly exceeded in efficiency any other method employed.

His practice had always been to treat those women during pregnancy, and the question had frequently been asked, "Why select the period of pregnancy?" At first he chose this time empirically but the experience of others, as well as his own, would seem to point to this being the most advantageous time, not only because in this way a child as well as a mother was being subjected to the influence of the spirochæticide, but also because the mother would seem to be more easily cured during this period. At least in his experience it was at this time that a negative Wassermann reaction was most easily obtained. A tempting explanation of the special efficacy of treatment during pregnancy consisted in the fact of the accompanying vascularity of the uterine tissues, which were probably the site of the spirochæte in the latent syphilitic mother, with consequently greater facilities for the influx of the spirochæticide to the true focus of the disease, but perhaps some subtle metabolic change among those brought about by pregnancy was the cause.

Ante-natal treatment was undoubtedly the treatment *par excellence*. It should be encouraged by them in every manner possible, and so far as he could see, this could only be achieved by the notification of all miscarriages, stillbirths, and examples of congenital syphilis. This, of course, was merely one aspect of the general question of notification of venereal disease, but to his mind a most important one. In the case of miscarriages and stillbirths, those due to syphilis were determined by means of the Wassermann reaction, and the mothers subjected to efficient treatment during the ensuing pregnancy. In this way not only would the vast majority of syphilitic pregnancies be carried to fruition, thus avoiding many stillbirths and miscarriages, but the health of those born would be ensured.

Dr. DAVID NABARRO

said that his experiences referred almost entirely to the Venereal Disease Clinic at the Children's Hospital, Great Ormond Street. Compared with those of

some observers, his record of cases might not be a large one, but he was in the fortunate, and possibly unique, position of taking the bloods and doing the Wassermann tests, and of treating and watching the cases himself. Thus, during the year 1920 he saw sixty-eight new positive cases, did 662 Wassermann reactions, and treated seventy-seven patients with 530 injections.

Until the end of last year he used novarsenobillon for the injections and with no ill-effects except a little sickness in a very few cases. He was now using neokharsivan for some patients and found that it increased the number of cases of vomiting immediately after the injection. Intravenous injections into an arm or the external jugular vein, but never into the superior longitudinal sinus, were given whenever possible. In the absence of a suitable vein the injections were given intramuscularly, and the drug was used in simple watery solution for both kinds of injection. For infants under 1 year the initial dose was 0.05 gm., increasing to 0.1 or 0.15 gm. For larger children the initial dose, according to the size of the child, was 0.1 or 0.15 gm., increasing to 0.3 or 0.45 gm. A course consisted of six weekly injections of novarsenobillon and simultaneous inunction with mercury ointment. At the end of the course some potassium iodide or syr. ferri iodidi was given for three weeks and then a Wassermann test taken. If necessary the course was repeated once or twice or even more often. Several of his patients had had eighteen to twenty-four injections totalling from 5 to 7 or 8 gm. of novarsenobillon, and one boy had had over 10 gm. of galy and novarsenobillon in twenty-eight injections without any ill-effects and, it should be added, with no effect upon the very strongly positive Wassermann reaction of his blood.

With regard to the Wassermann test, he had great faith in this when *reliably* done, and believed that a "strong positive" always meant syphilis. One must remember, however, that a positive Wassermann did not always prove that a particular lesion in a child was syphilitic in nature. Thus he had seen a tuberculous bone lesion in a syphilitic child and quite recently a case of poliomyelitis. A negative Wassermann did not always preclude syphilis. Very young children might give a negative reaction, so that he invariably tested, whenever possible, the blood of the mothers of infants under a year. The mother's blood was practically always positive (but varied in degree) when the child's blood was positive. Very rarely was the mother's blood negative when the child's was positive. He had found that the father's blood was frequently negative. Other children in the family might have a strongly positive Wassermann reaction. He was treating some of these cases, even in the absence of any symptoms, in the hope that thereby the later manifestations of congenital syphilis—especially the serious eye and ear lesions—might be averted.

As a result of the combined treatment with arsenic and mercury many of the patients were much benefited, but it was as yet too early to say that they were cured. Hearing might improve, ulcerations of the palate heal quickly, hæmoglobinuria be prevented, even mentally defective patients become brighter and less noisy and troublesome to their parents, as well as more intelligent. The keratitis cleared up more thoroughly perhaps than with mercury alone, but he could not say if the duration were shortened. Many of the young patients developing a rash at four, five or six weeks died in spite of the treatment.

In congenital syphilis, so far as his experience went, the Wassermann reaction could not easily be made negative. As already mentioned, one patient had had over 10 gr. of arsenic compound and much mercury, and his blood

was still very strongly positive. Out of sixty-two treated cases the Wassermann reaction had at some time or another become negative in only fourteen, and in five of these cases it had since become positive again.

Lastly, in view of: (1) the difficulty of certainly curing cases of congenital syphilis; (2) the heavy infantile mortality for which syphilis was directly and indirectly responsible; and (3) the large amount of mental and physical disability which congenital syphilis produced—especially mental deficiency, impairment and even total loss of sight and deafness—it was obvious that attempts should be made to treat the child before it was born by treating the mother. It had now been abundantly proved that by treating a prospective mother by the combined method she would be delivered of a healthy child, in most cases.

Dr. AMAND ROUTH

wished to speak from the obstetric and ante-natal standpoints, for congenital syphilis would never be stamped out unless the infected fetuses were treated through their mothers during pregnancy. Probably the deaths of the embryos and fetuses were as numerous, during their mother's pregnancies, as the deaths of the surviving infants during the first year of life, which latter deaths in 1919 amounted to 61,715. It had been estimated that in each of these periods about 16 per cent. of the deaths were of syphilitic origin, which would mean that 20,000 potential citizens died annually between fertilization of the ovum, and the end of the infantile year. Many of the intra-uterine deaths would occur very early in pregnancy before Nature's protection or treatment of the mother could effectively operate, and the abortions would be unrecognized as such.

The infantile deaths of syphilitic children would occur chiefly at two periods—one during the first week or two after birth, due to the debilitated new-born children being unable to stand the strain of birth, and the other later on in the infantile year when congenital syphilitics, born apparently healthy, had become clinically syphilitic.

The tendency for weakened children to die soon after birth was shown by the fact that in 1919, out of 61,715 infantile deaths, 8,383 died in the first twenty-four hours of life, and 9,388 in the next six days, together being more than a fourth of the infantile deaths. The reduction of infantile mortality in 1917-18-19 had been entirely from reduction of causes operating in the later months of the year.

Owing to the absence of confidential death certificates in this country (alone in this respect amongst European countries) the mortality of congenital syphilitic children who had not been treated through their mothers during pregnancy, was not known, but Dr. Helen Campbell, head of the Infants' Health Department in Bradford, had reported that in 1918 out of 1,606 children under her care, 148 died, and of these 120 (81.08 per cent.) were congenital syphilitics. Of the 107 legitimate children who died, eighty-three (77.5 per cent.) had congenital syphilis, and of the forty-one illegitimate children who died, thirty-seven (90.2 per cent.) had syphilis. Dr. Helen Campbell said that these deaths of congenital syphilitics were due to the fact that they were peculiarly selected for attack by respiratory, gastro-intestinal, and specific (measles) infections which killed them in much larger numbers than infants not so affected.

Obviously these children, infected from their conception, must be treated

during their mothers' pregnancy if they were to be born healthy. Up to 1905 pregnant mothers, who had previously had syphilitic children, had been treated by mercury from the third month of pregnancy, and healthy children were born and reared, but the treatment had to be adopted at each subsequent pregnancy. Was this necessary now under salvarsan treatment? No doubt, however, treatment should be begun as early as possible, though Mr. John Adams, Mr. Charles Gibbs, Dr. Sequeira and Dr. Morna Rawlins had proved that treatment of the pregnant mother by salvarsan could be begun as late as the seventh or eighth month, with the great probability that a healthy child would be born. This was a surprising result. Such a cure could not happen in cases where the child's organs were already diseased and full of active spirochætes, but only where the infection was in a quiescent stage rendered latent by natural agents.

The fact of latent syphilis in pregnancy was now admitted to be frequently present, especially as regards the child. If this were not so, no infected fœtus could live *in utero* for nine months with active syphilis progressing. The ovum could be infected at fertilization or soon after whilst implanted in the uterine mucosa by early "granule" stages of the mature spirochætal organism. These granules were the result of spontaneous breaking up of the spirochætes. Noguchi had described how he had reared such granules in a series of cultures from 1910 to 1917, and had seen them "sprout" and develop into the mature spirochæte, capable of infecting monkeys and rabbits.

Sir F. W. Mott had quoted O'Farrell and A. Balfour to show that "injections of salvarsan caused shedding of granules from the *Spirochæta pallida*," and he (Dr. Routh) believed that a similar result was obtained by the action of the syncytial toxins, formed throughout pregnancy, during the trophoblastic action of the cells of chorionic villi, whilst burrowing into the maternal tissues at the placental site, at the point of union of the mother and fœtus. The infection was, he believed, rendered latent by the granules being kept biologically inactive, perhaps by the prompt destruction of their delicate reproductive "sprouts." In such cases the child would be infected by the inhibited granules, and would have a negative Wassermann reaction, and if the mature organism were absent also from the mother's tissues, she also might be negative during the pregnancy. If the mother had not been treated during her pregnancy the child might be born apparently healthy owing to the infection being latent, but as the syncytial toxins (or "chorionic ferments") disappeared from its tissues, the granules began to develop into the mature organism, and the child would give a positive Wassermann reaction owing to enough antibodies being produced to excite a general reaction in its blood, and the child would then become clinically syphilitic. Occasionally the natural protection afforded by this syncytial action would be so strong that the granules would not only be inhibited but destroyed and the child would be born free of syphilis. This explained the occasional birth of a healthy child amidst a series of stillbirths or infected children.

The cause of death was "unknown" in about 25 per cent. of stillbirths, and in a larger proportion of abortions. Mr. Eardley Holland was working at this problem, and considered that in the absence of spirochætes chondro-epiphysitis was a certain sign of syphilis, whilst enlargement of the liver and spleen are less certain indications. Mr. Holland thought that further research would reduce the large class of "unknown cause of death" in macerated fœtuses, and increase the class of cases due to syphilis. Dr. Routh felt sure he was right. It might also be possible, by staining or culture, to recognize earlier stages of the mature organism.

With their present knowledge, congenital syphilis could be prevented or cured if every syphilitic mother be treated, not only during her pregnancy but in anticipation of the next pregnancy till she was definitely cured. The child, however, might need treatment after birth for a length of time not yet agreed upon. There must be serious cases of embryonic or foetal infection where it was not rendered latent early enough to save the child's life, but all such cases would terminate in abortions or stillbirths. All other cases seemed to be amenable to modern treatment during pregnancy even up to the seventh and eighth month. The real difficulties were (1) to get the mothers under medical supervision for diagnosis and appropriate treatment, and (2) to be able to enforce treatment for a sufficiently long period to obtain the desired result.

If these difficulties could be surmounted, congenital syphilis could be stamped out by ante-natal treatment of the mother, but to begin treatment of a congenitally syphilitic child, with a positive Wassermann reaction, only after its birth, and with clinical manifestations present was almost certain to be ineffectual either to cure, or even to make the Wassermann reaction permanently negative, as Dr. Findlay, Dr. Nabarro and others had proved in that day's discussion.

Mr. N. BISHOP HARMAN

said that for the past seventeen years he had had the oversight of a number of London schools for the blind and partially blind. During that period it had been his habit to keep records of the conditions producing blindness, and in the case of blindness due to congenital syphilis to note the associated clinical symptoms. All the cases coming into this statement had been under extended treatment at some London hospital and they were not admitted into the blind schools until such time as the treatment had been carried out to such an extent that there was no anticipation of further improvement, at any rate of such a degree as to remove them from the category of the blind or partially blind. In most cases the children had been under his observation during their attendance at these schools from their admission at an average age of 7 or 8 years until they left at 16 years, so that ample opportunity had been afforded for noting what variation, if any, there had been during the period of growth.

It was convenient to divide the cases into two groups according as the major effects of the inflammatory changes affected the tissues in the anterior parts of the eye or at the posterior parts. The division was purely arbitrary, for in not a few cases the inflammatory effects were seen both in front and at back, but the division enabled certain useful comparisons to be made.

(1) *Inflammations of the Anterior Part of the Eye.*

Those affecting the front half of the eye total 413 cases, of which 284 were blind and 129 partly blind. By far the greater number of cases were due to interstitial keratitis of congenital syphilitic origin. There were only fifteen non-syphilitic cases, including thirteen of tubercular interstitial keratitis and two cerebro-spinal irido-cyclitis.

Interstitial keratitis due to congenital syphilis	...	...	...	362
Ditto, evidence of syphilis not certain	...	...	...	24
Iritis or irido-cyclitis due to congenital syphilis	...	...	...	7
Ditto, evidence of syphilis not certain	...	...	...	5

In recording the conditions found in these cases it was customary to note all the confirmatory signs of the diagnosis, and these had been classified. The clinical signs of congenital syphilis were many, and some of them were so definitely characteristic that there could be no doubt of the certainty of the diagnosis. In most of the cases there were several confirmatory signs, and no case was included as syphilitic unless at least one of these confirmatory signs were present. In the twenty-four cases of interstitial keratitis and five of iritis marked "not certain," the characters of the eye lesions were such that a diagnosis of congenital syphilis appeared to be justified, but there were no confirmatory signs in other parts of the body. It might be noted that some of these cases had been seen before the Wassermann reaction was discovered; others could not be got to attend hospital for the purpose of making the test. Confirmatory signs of congenital syphilis in 369 cases of interstitial keratitis and iritis:—

Hutchinsonian teeth (including a few "Moon's teeth")	...	...	...	265
Characteristic physiognomy	...	...	...	115
Iritis	...	...	...	128
Disseminated choroiditis (often the fundus could not be seen)	...	...	...	53
Bad family history	...	...	...	170
Scars at the angles of the mouth	...	...	...	61
Evidence of bone or joint disease	...	...	...	26
Ulceration of the nose or palate	...	...	...	15
Deafness	...	...	...	63

(II) *Inflammation of the Posterior Part of the Eye.*

Of these inflammations affecting the posterior half of the eye by far the greater number were due to a form of choroiditis known as "disseminated." This condition could not be said to be diagnostic of syphilis, for other conditions were capable of causing the same or very similar conditions, but all the evidence went to prove that these cases in children were overwhelmingly syphilitic in origin. With the choroiditis there was always more or less atrophy of the retina and of the optic nerve, so that vision was gravely impaired. Closely associated with these cases were many cases of total optic atrophy.

This group included 349 cases, of which 294 were blind and fifty-five partly sighted. Of these, 210 were definitely the subjects of congenital syphilis, and there were nineteen in which the eye lesions were very suggestive of a syphilitic origin though the diagnosis was not confirmed by other signs. The analysis of the clinical conditions found in these cases was as follows:—

Disseminated choroiditis with or without optic atrophy (of syphilitic origin)	...	210
Ditto (syphilis not certain)	...	19
Optic atrophy marked	...	117
Hutchinsonian teeth	...	97
Characteristic physiognomy	...	53
Bad family history	...	115
Evidence of bone or joint disease	...	19
Deafness	...	8
Grave mental defect	...	51

(III) *Comparison of Frequency of Associated Symptoms according as the Disease was most manifest in the Anterior or Posterior Part of the Eye.*

There were some points of clinical interest in the comparison of the frequency of the occurrence of the chief clinical manifestations of congenital syphilis, in the body generally, in addition to the eye inflammations; and their relative frequency as between inflammations of the front of the eye in

interstitial keratitis, and the back of the eye in disseminated choroiditis. It was noteworthy that the most serious general symptoms were found where the disease affected the deep, vascular structures of the back of the eye.

Symptom	Interstitial keratitis (362 cases)		Disseminated choroiditis (310 cases)	
	Number	Percentage	Number	Percentage
Hutchinsonian teeth ...	265	73.0	97	46.0
Bad family history ...	170	47.0	115	54.8
Gross mental disorder, insanity, &c. ...	—	—	51	40.5

(in 126 cases)

Gross Mental Disorder.—Amongst the subjects of interstitial keratitis were many dull and backward children; the long and severe eye inflammation would be sufficient to account for this; but there were no cases definitely returned as mentally defective. The reverse had been found in disseminated choroiditis; at one time a series of these cases was followed up with the following findings:—

Became insane ...	26	Syphilitic (certain) ...	22
Mentally deficient ...	24	" " ...	18
Microcephalic idiots ...	4	" " ...	2
Epileptic ...	10	" " ...	9
Total ...	64		51

Bad Family History.—In 1913 the family histories of 150 mothers of blind syphilitic children had been worked out, and for a control the histories of 150 "average" mothers seen at hospital, in respect of whom there was no knowledge of syphilis. (No special measures were taken to determine this other than a reference to the mother's case card.) The results were as follows:—

150 mothers	Pregnancies	"Healthy" children	Miscarriages	Still-births	Infant deaths	Diseased with syphilis
Syphilitic ...	1,001	390	92	80	229	210
"Average" ...	826	654	61	17	94	—

The outcome of the pregnancies of the two sets of mothers could be better compared by setting them against each other on the per thousand basis:—

Mothers	"Healthy" children	Miscarriages	Still-births	Infant deaths	Diseased with syphilis
Syphilitic ...	390	92	80	229	210
"Average" ...	791.7	73.8	20.5	113.9	—

The killing effect of syphilis upon the product of conceptions was very severe: of the 1,001 pregnancies of the syphilitic mothers no less than 401 had been lost as miscarriages, abortions, or infant deaths, and only 390 presumed "healthy" children had been produced! The average mothers had produced nearly twice the number of healthy children from little more than three-fourths the number of pregnancies.

(IV) *Nerve Reflexes.*

An account of the systematic examination of the knee-jerk phenomenon in patients suffering from interstitial keratitis the result of congenital syphilis had been published some time ago by Lang and Casey Wood.¹ The results of

¹ *Ophthalm. Hosp. Reports*, 1888, xii, p. 312.

this investigation of the phenomenon were summarized thus: "(1) That in about 30 per cent. of all cases of interstitial keratitis the knee-jerk is decidedly sub-normal. (2) That in about 10 per cent. of all cases it is entirely absent—all known causes of subnormal tendon reflexes, outside the constant fact that the local eye disease exists, having been eliminated. (3) . . . (4) That it is rare to find a case of exaggerated patella tendon reflex in interstitial keratitis when unaccompanied by some of the affections known to produce the former." In all they had examined sixty-two cases. There was some interest in checking or confirming these results and in 1903 he had examined 100 subjects of interstitial keratitis the result of congenital syphilis. As a standard of comparison he had examined at the same time an equal number of healthy individuals, choosing the same number of each age and sex found amongst the diseased. Special measures were taken to secure a uniform method of examination.

The results of this examination were stated in detail in an ophthalmic paper,¹ with a table showing the results in graphic form.

These results showed no noteworthy difference between the condition of the knee-jerk phenomenon in the subjects of constitutional syphilis and in healthy folk, the figures were surprisingly alike. In seventy-five cases of disease the reactions were normal; in health, seventy-four; whilst there was a fair number of brisk and exaggerated reactions. A comparison of the condition of the phenomenon in varying states of manifestations of congenital syphilis, in acute attacks, relapses, or in quiescence of the manifestations, or when under specific treatment or otherwise, did not show any noticeable differences.

(The Meeting was adjourned to March 16.)

¹ *Ophthal. Rev.*, September, 1903.

Section for the Study of Disease in Children.

President—Dr. FREDERICK LANGMEAD.

DISCUSSION ON THE DIAGNOSIS AND TREATMENT OF CONGENITAL SYPHILIS.¹

Dr. MORLEY FLETCHER

said that in reopening the discussion on congenital syphilis he proposed to follow in the main the line taken by Sir Humphry Rolleston in his suggestive address.

He would like first to make a few remarks on the *prevalence* of the disease and on its type as they saw it at the present time. In one of the widely read English books on the diseases of children the author stated that congenital syphilis was a *rare* disease. With this, he thought, few of them could agree, and if Sir Humphry Rolleston's interesting suggestions as to its relationship to lesions of the endocrine glands could be established as facts the disease would assume an even greater importance than it previously possessed. Possibly the discrepancy of opinion as to the prevalence of the disease might be explained by a gradual change in type.

He ventured to suggest that congenital syphilis in London had undergone considerable modification in type during the past twenty-five years—at least that was his personal experience. The number of infants with frank manifestations of syphilis, skin eruptions, rhagades, condylomata, &c., was less than it had been. This did not imply that the case-frequency of the disease had diminished, but that there had been a gradual change of type, and it seemed to have become increasingly rare to see the syphilitic infant as described in the textbooks. It was true that he did not now see the same number of infants as he did twenty-five years ago and allowance must be made for this. Also many syphilitic children were sent to skin departments, who in former years would have been treated on the medical side of a hospital. But from inquiries made, there would appear to be grounds for believing that the type of disease in infants as it was seen at present in London did not seem to be so severe as it had been formerly. This might be explained in two ways: (1) that the infection was of a milder type: or (2) that resistance to the infection was gradually increasing or changing in some way. It would be of value to have information as to the experience of others on this point.

Following the line of discussion laid down by Sir Humphry Rolleston, he proposed to confine his remarks to three points: (1) the Wassermann reaction; (2) the influence of congenital syphilis on other diseases; (3) the influence of congenital syphilis on certain organs, particularly the kidney.

(1) *Wassermann Reaction.*

There could be little question at the present time as to the value of the Wassermann reaction as carried out by a competent pathologist. Sir Humphry Rolleston, Dr. L. Findlay, and Dr. D. Nabarro had already discussed this from

¹ At an adjourned meeting of the Section, held March 16, 1921.

different points of view. It was generally agreed that a positive reaction in a child, either with or without stigmata indicated the necessity for active treatment which could be continued until the reaction became negative. A negative reaction, whether as the result of treatment or not, did not necessarily mean that the disease had died out. Both in children and adults one repeatedly saw cases in which a definitely positive reaction became negative after treatment and again became positive after lapse of time.

A negative reaction might be present in the following circumstances: (1) infection had not been incurred; (2) the infection might have completely died out, though it might have caused pathological changes, or disturbance of function in various organs; (3) spirochaetes might be lurking in a quiescent state in some tissue or organ of the body, antibodies not being produced; (4) the spirochaetes might have undergone some change of state, such as a granular stage, which had been referred to by Dr. A. Routh.

As to the value of a provocative dose of salvarsan in cases giving a negative reaction, he had not had a sufficiently large experience, but he might say that not in a single instance had he seen a positive reaction follow a provocative injection. (It would be interesting to hear the experience of others on this point.)

Sir Humphry Rolleston made a valuable suggestion in pointing out the advisability of examining in doubtful cases the Wassermann reaction in both blood and cerebro-spinal fluid. There could be no doubt as to the importance of this procedure, though it was more difficult to carry out with children than with adults, as anaesthesia had so often to be employed in the young. Personally he had never met with a positive reaction in the cerebro-spinal fluid of a child in which the blood reaction was not also positive.

The problem of the Wassermann reaction could not be solved by the clinicians, and must be left in the hands of the laboratory workers for much further investigation.

(II) *Congenital Syphilis and its Relation to Other Infective Disease.*

Resistance to infection was lowered in syphilitic children, especially in the first few years of life. This was generally recognized as regards the acute infections. With these, however, he did not intend to deal, but to confine himself to the association of syphilis and tuberculosis. These diseases might be regarded as the two commonest chronic infections of infancy and childhood, and it would be surprising if they were not frequently met with in the same subject. At the same time he did not think the association of these diseases was sufficiently recognized. Lymphadenitis was the form of tuberculous disease he had seen most frequently in syphilitic children, mostly affecting the cervical glands, which in some cases had been treated by operation. The cases presented the characteristic appearances of tuberculous glands: caseation, skin involvement, &c. The interesting point about these cases in which syphilitic stigmata had been previously overlooked was the very marked improvement which followed active antisyphilitic treatment. Two cases in older children which he had seen with Dr. H. G. Adamson, had enlarged cervical glands (with partial excision in one case) and exhibited cutaneous rashes of the tuberculide variety described as Bazin's disease (dermatitis scrophulosorum induratum). The Wassermann reaction was positive in both. Antisyphilitic treatment brought about a marked improvement in the tuberculous glands and the skin lesions which had not been affected by other

forms of treatment. The same improvement, as the result of treatment of the syphilis, might occur in syphilitic adults suffering from pulmonary tuberculosis.

He mentioned these facts in order to draw attention to an association of disease which, he thought, was often overlooked. In tuberculous cases in which the family history was suggestive of syphilis or in which stigmata were present, however slightly, the Wassermann reaction should be employed. Treatment of the syphilis might bring about a far more rapid improvement of the tuberculous lesion than would have been possible without it.

(III) *The Influence of Congenital Syphilis on Certain Organs of the Body especially the Kidneys.*

One of the most striking features of congenital syphilis was the widespread nature of the lesions it produced. No tissue or organ of the body was immune. The internal and external secretory organs were those with which they were now concerned, and each one of these was liable to undergo definite pathological changes which had been fully described. Sir Humphry Rolleston suggested that the changes in the endocrine glands brought about by congenital syphilis might be responsible for many and varied conditions, such as dyspituitarism, some of the obscure bony diseases, lipodystrophia, &c. With the means at their disposal it seemed equally difficult to prove or to disprove this point. In the great majority of cases of such diseases of the endocrine glands the Wassermann reaction was negative and stigmata were absent. But damage might have been caused by a syphilitic infection which had died out and which later might bring about a diminution of activity of the affected gland or glands. But further evidence must be brought forward before they could ascribe a syphilitic origin to the impaired functions of these glands.

They were perhaps on more secure grounds when they considered the external secretory organs, especially the liver and kidneys. With the liver he did not propose to deal, as probably the changes due to syphilis in this organ had been more fully investigated than those in any other gland. It was somewhat remarkable that comparatively little investigation had been made as to the early and late effects of congenital syphilis on the kidneys.

Sir Humphry Rolleston had suggested that the extensive renal changes found in the group of cases associated with dwarfism or infantilism were due to syphilis. The general consensus of opinion at the present time would seem to be opposed to this view. He might mention that the last case of this description brought by him before the Royal Society of Medicine had given a negative Wassermann reaction in both the blood and cerebro-spinal fluid.

It might be urged that the kidney lesions were due to a syphilitic infection which had died out. Against this he would point out that the changes in the kidneys were always very marked and indicated some infective or toxic agent of considerable virulence. Had syphilis been the cause one would expect other organs to have been affected to a greater or less degree, whereas it was significant that the kidneys alone exhibited changes, except for the secondary changes in the cardio-vascular system.

The morbid changes found in the congenital syphilitic kidney might be briefly summarized as follows:—

- (1) In the foetus—stillborn at term, and abortions. In these there was

often evidence of arrested development. Groups of cells of embryonal type surrounded by normally developed tissue and a varying degree of small-cell infiltration of the cortex.

(2) In infants. Similar changes might be present, but sclerosis might have begun. Areas of infiltration adjoining zones of proliferating connective-tissue cells and bands of fibrous tissue. Queslier¹ stated that in most cases the lesions, whether old or recent, were arranged as islets with normal areas between them. They were situated mostly in the cortex, and the kidneys were often unequally affected.

(3) In older children the sclerosis was more diffuse and the capsule was adherent; the weight of the kidneys was generally unequal and was diminished.

This was a very brief summary of the more severe types of renal disease due to congenital syphilis; it was only reasonable to believe that there were milder degrees of involvement. Also, as in the case of the liver, as the result of treatment recovery might take place, but the organs might be rendered unduly liable to disturbance later on in life by comparatively slight causes. Rose Bradford and others had suggested that cases of so-called idiopathic nephritis might be due to syphilis as a predisposing cause. If this were true, the influence of syphilis might be explained by the supposition that the spirochætes, although they had died out, had left behind a damaged organ or one which was peculiarly susceptible. A mild attack of one of the specific fevers, such as varicella, in a child known to be syphilitic might be followed by an acute nephritis.

Hutinel² had drawn attention to the vulnerability of the kidney in congenital syphilis, and had pointed out the liability to relapse which these cases of nephritis might exhibit. In some the exciting cause might be a slight attack of tonsillitis or of impetigo. Syphilis might be a factor in some of the not uncommon cases of intermittent albuminuria of childhood. As in the case of the liver there might be a long latent period (during which the spirochætes might be present but inactive), and in these signs of nephritis make their appearance about the time of puberty as the result of some other infective or distributing cause which might rouse the spirochætes again into activity.

Time would not permit further consideration of these clinical manifestations, but his object was to draw attention to the very important relationship congenital syphilis might bear to kidney disease, and to urge that the necessity of determining whether syphilis was a factor should be borne in mind in dealing with doubtful cases of renal disease in children.

The lungs also might be affected by congenital syphilis. The association with tuberculosis had been referred to, and he would say no more on this point. Pneumonia alba was a rare massive condition of the lung found in new-born infants, and so far as he knew had no special clinical interest. But syphilis might also give rise to a slighter degree of infiltration compatible with longer life, which might lead to pulmonary fibrosis and, according to Still and others, to bronchiectasis. It might well be that in cases of latent syphilis an attack of broncho-pneumonia or acute bronchitis might stimulate the resting spirochætes into action and fibrosis or bronchiectasis ultimately result. It would be interesting to know what proportion of cases of fibrosis of the lung gave a positive Wassermann reaction.

¹ *Gaz. des Hôp., civ. et mil.*, 1920, pp. 1016-1109.

² Hutinel, *Paris Médical*, 1919, p. 65.

Conclusion.

In conclusion, a few words about *treatment*. It seemed to be generally agreed that intravenous injections of one or other of the modern arsenical compounds should be combined with the administration of mercury either by the skin or mouth. He had been impressed on several occasions with the small doses of mercury given by the mouth by some practitioners. Infants and children were remarkably tolerant of this drug, and he did not think that the best results were obtained unless comparatively large doses were given: beginning with $\frac{3}{4}$ gr. doses of pulv. hyd. c. creta twice daily, then thrice, and gradually increasing this up to $1\frac{1}{2}$ gr. thrice daily. This should not be followed by any ill-effects. His late colleague, Dr. Eustace Smith, had been in the habit of giving considerably larger doses than these. Should the drug cause diarrhoea, as it might do, though rarely, when first given, an equal quantity of aromatic chalk powder combined with it would prevent any looseness of the bowels.

MR. JOHN ADAMS

desired to confine his remarks to discussing ante-natal and post-natal syphilis and its treatment. Congenital syphilis in children and adults was comparatively rare, and for a reason he would refer to later. The treatment of these patients was very unsatisfactory, whereas the treatment of ante-natal and immediate post-natal syphilis—treating the child soon after birth—was most encouraging. The proper time to commence the treatment of these cases was as soon as they were seen. In the newly-born no secondary results occurred if they were adequately treated: he had not seen such in his clinic in a child for the last two years. If manifestations of syphilis were not seen in the first three, six, or twelve months, they were not likely to be seen afterwards. If treated very early, these young patients rarely if ever reverted to a positive Wassermann. Up to six months ago, the cases with which he had kept in touch numbered ninety-five, and he had them tested every three months. He passed round a table giving particulars and results of treatment; it was the treatment which he had found by far the most satisfactory. They all had intramuscular injection of galyl in the gluteal region, and intramuscular injections of mercury at the intervals stated in the table, and mercury as hyd. cum creta daily by the mouth. He had seen cases injected into the superior longitudinal sinus, and into the external jugular vein; but he considered these procedures unnecessary. Except in expert hands it was a dangerous proceeding, and disaster was needlessly courted. In children the effect from salvarsan and its substitutes was remarkably rapid. Babies had been brought to him practically dying of syphilis, and he had given them an intramuscular injection, and in four to six hours there was clinical evidence of improvement. The earliest case he had ever treated was one in which he commenced an hour after birth.

He wished to ascertain opinions on a point of physiological interest. A woman seven months advanced in pregnancy, with two months to term, became infected with syphilis; she had no treatment, and had just time to develop generalized syphilis at full term. The child so born gave a negative Wassermann. For the sake of information he had left the child untreated, and found it remained negative. Yet there was a free interchange between mother and baby at that period, so there must be some barrier against the child acquiring its mother's disease. He could only account for it on the

lines on which Dr. Amand Routh argued : that there was some special ferment formed in the placenta which had the power of destroying the syphilitic virus before it reached the child.

In January, 1918, Dr. Routh brought before the Harveian Society some statistics which were of great importance. He estimated that 27,000 deaths in England and Wales alone occurred annually in the ante-natal period or in the first week after birth as the result of syphilis ; and it was said that 50 per cent. of all syphilitic fœtuses were stillborn, and that 75 per cent. of those born alive died within the first year, most of those deaths taking place within the first week of life. That gave the answer to the question, Why were more syphilitic children not seen in the clinics ? It was, because they were not alive to be seen. In the book passed round he gave a table embracing ninety-five consecutive cases, which he had had in three years, children born of syphilitic mothers. In 1917-18 there were twenty-eight. Three of them died, at the third, fourteenth, and thirty-ninth day respectively. In 1918-19 he had thirty syphilitic mothers tested by independent bacteriologists. Of their children, eight showed a positive, twenty-one a negative Wassermann, and one died at two months. In 1919-20 he had a record which he did not expect to see repeated. There were thirty-seven syphilitic mothers, and only one had a child born with a positive reaction, and none of the thirty-seven went out of the clinic with an unhealthy child. Such good results could now be attained with a good deal of certainty.

He considered that lying-in centres for the treatment of venereal disease ought to be established in every large town, with a medical officer specially appointed to look after these cases. He did not wish it inferred that he considered salvarsan was the saviour of human life afflicted with syphilis ; as he wrote in a paper some time ago, " while yielding to none in his admiration of the treatment of syphilis by salvarsan and its substitutes, which gave results of a brilliancy hitherto unattained, he believed that the administration of mercury remained as important for the cure of syphilis as ever, and his view was that too little of that drug was given." He looked forward with the greatest confidence in the future to seeing the wastage of infant life from this disease come practically to a vanishing point. He doubted whether any disease, even tuberculosis, was so destructive of child life or so disastrous to child health as syphilis. A fortnight ago six children who had been treated for congenital syphilis returned to his clinic, and he asked for opinions from the visitors present as to whether they seemed to be up to the health of the average child met in the street. The unanimous opinion was that they were better.

There were two great drugs available in the treatment of syphilis—arsenic and mercury. In congenital syphilis he put arsenic first, as the great rescuer from early death, and then the treatment should be carried on with the aid of mercury. It must not be expected that syphilis would be cured in a week, nor in a month. The minimum time he gave was a year.

DR. REGINALD C. JEWESBURY

said that a year ago it had been decided to form a special clinic in the Children's Department of St. Thomas's Hospital for children suffering from syphilitic infection. One morning a week had been set aside for this clinic, which drew its cases from the rest of the children's department and other

special departments, including that for venereal disease, under the direction of Colonel L. W. Harrison, D.S.O.

He wished to confine his remarks to the findings of this clinic. During the first twelve months a total of 145 children had been seen whose mothers were known to be syphilitic. Of these, nine mothers had become infected after the births of their children, hence the disease in these children had been acquired. Of the remaining 136 mothers, infected *before* the birth of the child, forty-seven had had treatment before or during pregnancy. In eighty-nine cases the mothers had received no treatment previous to the birth of the child.

Incidence.

First, with regard to the incidence of the disease in families as it affected the children born of syphilitic parents; in about 50 per cent. of the cases the disease had been most marked in the earlier pregnancies, and appeared to become gradually attenuated, apparently healthy children coming at the end of the family (regular type). But in just as many cases children apparently free from infection had cropped up irregularly in the midst of definitely syphilitic children and miscarriages (irregular type).

Examples of Regular Type of Family.

A. (i.)

- (1) (2) (3) Healthy children.

Infection—

- (4) (5) Premature child, lived one day.
 (6) Premature child, stillborn.
 (7) (8) Stillborn.
 (9) Miscarriage.
 (10) (11) Apparently healthy children. Wassermann reaction negative.

A. (ii.)

- (1) Died at 18 months. "Fits."
 (2) Miscarriage at $4\frac{1}{2}$ months.
 (3) (4) Miscarriage at 6 weeks.
 (5) Twins (D, syphilitic child; Wassermann positive.
 (6) (M, apparently healthy; Wassermann negative.

In this case the syphilitic twin had shown obvious clinical signs of disease, whilst the other one was free from all such signs, and the Wassermann reaction was repeatedly negative up to 6 years of age.

Examples of the Irregular Type of Family.

B. (i.)

- (1) Seven-months' child; died at 3 days.
 (2) Eight-months' child; died at 7 days.
 (3) (4) Stillborn.
 (5) Now living, aged 19 years; healthy.
 (6) Now living, aged 17 years; healthy.
 (7) Stillborn.
 (8) Died at 7 days.
 (9) Stillborn; macerated foetus.
 (10) (11) Miscarriage.
 (12) Now living, aged 9 years; Wassermann reaction +; interstitial keratitis.
 (13) (14) Miscarriage.
 (15) Twins, stillborn.
 (16) Miscarriage.

B. (ii.)

- (1) Died at 9 months.
Then six miscarriages.
 - (8) Died at 8½ years ("heart disease").
 - (9) Now living; Wassermann reaction +++.
 - (10) Died at 2 years.
 - (11) Died at 11 weeks ("bronchitis").
 - (12) Died at 2½ years ("wasting").
 - (13) Now living, aged 4 years; apparently healthy; Wassermann reaction negative.
 - (14) Died at 14 months (blind).
 - (15) Now living, aged 1 year; Wassermann reaction +++.
- Mother, Wassermann reaction ++++.
- Treatment began since birth of last child.

Signs in the Child.

- (1) A few children of syphilitic mothers who had received no treatment were quite free from any signs, and had given negative Wassermann reactions even up to the age of 10 to 14 years.
- (2) Many children had shown the usual signs seen in typical congenital syphilis, in whom rash and snuffles appeared two to eight weeks after birth.
- (3) In a certain number of children seen, in whom there was no history of previous symptoms, symptoms had developed late, after the fifth or sixth year—i.e., "lues tarda." This group amounted to 10 per cent. of all cases examined.

In these children lesions of the following structures had been present: bones—periostitis; joints—synovitis; eyes—interstitial keratitis; brain—particularly affecting mental condition, ears—deafness; and teeth.

Cases Illustrative of Late Changes.

Case 1.—E. F., boy, aged 12 years. Family history: two stillborn children previous to birth of this child. The latter healthy at birth; full time; no rash or snuffles; apparently normal child up to 5 years. First changes had been mental, lack of concentration, loss of memory, &c. Boy much undersized; no definite physical stigmata. Skin, teeth and bones—no signs. Eyes: pupils sluggish to light, equal. No keratitis; fundi normal. Viscera: spleen and liver not enlarged; reflexes normal; no ataxy; Wassermann reaction of blood and cerebro-spinal fluid ++.

Case 2.—J. R., boy, aged 11½ years. Family history as follows: (1) Died soon after birth; (2) stillborn; (3) died at birth; (4) stillborn; (5) the patient, Wassermann reaction ++++; (6) living, Wassermann reaction ++++; (7) living, Wassermann reaction ++++; (8) living, Wassermann reaction -. No definite notes of mother's treatment; said to have had some treatment five years before birth of this child. Child full time, no signs during infancy. "Meningitis" at 2 years, very ill for two months, good recovery, well up to 9 years, had then complained of frequent headaches, became dull and stupid. At 10 years had become clumsy, and began to lose use of limbs. Sight good. Not deaf. A big, well-developed boy, coarse features, high palate, very dull. Slight glandular enlargement. No other signs. Fundi normal. Reflexes normal. Wassermann reaction reduced after seven injections N.A.B. and mercury by mouth.

Wassermann Reaction as a Means of Diagnosis.

This had been found to be a very valuable and reliable test. In the case of syphilitic infants, the reaction was often negative during the first few months of life and later became positive. In cases in which the test was negative at

first it had been repeated every six months until the child was 2 years old. The reactions had been carried out in the Pathological Department under the direction of Professor L. S. Dudgeon.

Effect on Child in Untreated Syphilitic Mother.

Seventy-seven families investigated; total number of pregnancies, 322. Of these 97 (30.2 per cent.) had resulted in miscarriage or stillbirth, 73 (22.8 per cent.) had resulted in death in infancy or early childhood, and 152 (47.0 per cent.) had been still alive at time of investigation. Mortality of children born alive, 32.4 per cent.

Effect on Child when the Mother had been Treated Before or During Pregnancy.

Number of cases investigated, 43. Treatment had varied from three courses of N.A.B. and mercury down to a few doses of mercury as late as the ninth month of pregnancy. Number of cases treated effectively before or during the early stages of pregnancy, 39. Total number of pregnancies, 53. Of these, 1 had resulted in miscarriage, 6 in death in infancy, 46 in living children. There had been therefore 87 per cent. of living children at time of examination. Actual mortality of this series of children had been 11.5 against 32.4 of the former series. It had been found that where the treatment of the mother was not begun until the seventh month or later of pregnancy the child usually showed well-marked evidence of syphilis, but in the majority of mothers who had received treatment not later than the fifth month of pregnancy the children were born apparently healthy and gave negative Wassermann reactions.

Effect of Treatment on the Child.

Method.—In most cases novarsenobillon had been given intramuscularly into the buttock. Dose 0.015 grm. per kilo of body weight, with gradually increasing doses, at intervals of one week, for six injections. In some cases a second course had been given at an interval of about three months. Simultaneously, mercury in the form of hydrarg. cum cret. in $\frac{1}{2}$ -1 gr. doses by the mouth t.d.s., this being kept up regularly. In a few severe cases mercurial inunction had been ordered. In the majority of cases the N.A.B. injections had caused no kind of ill-result. A few cases had been followed by pain for some time after, and induration at the site of injection. No case had been followed by suppuration. In a few cases a slight general reaction had been set up, with headache, drowsiness, and vomiting, usually not lasting longer than twelve hours. In the older children the N.A.B. had been given intravenously.

Effect of Treatment on Wassermann Reaction in the Child.

In 30 cases receiving full course of N.A.B. and Hg and kept under observation the Wassermann reaction had been changed from "positive" to "negative." In some a strongly positive reaction had been reduced. In some the reaction had not been affected after a course of six injections of N.A.B. and Hg. The cases benefiting least by treatment with regard to the Wassermann reaction and physical signs were those of the late manifestations affecting children from 5 to 10 years, and especially those cases in whom the central nervous system was involved.

Effect of Treatment on Clinical Signs of Disease in the Child.

Early signs had quickly cleared up, especially rashes and condylomata. Rhinitis less easily cured. Usually rapid improvement in general condition, with steady gain in weight. Liver and spleen reduced in size.

Late Cases.—No case of disease of the central nervous system affected. Interstitial keratitis; some definite improvement of vision in several cases. Periostitis definitely improved.

In this work he was indebted to several assistants, particularly to Dr. J. C. Spence, who had kept very careful notes of every case seen and had also helped with the clinical work.

Mr. J. E. R. McDONAGH

said that, in his opinion, congenital syphilis was one of the most difficult subjects in medicine, as several problems arose which had no parallel in other diseases. He would state those problems in the form of questions and would answer them as far as his limited experience permitted.

(1) *If a woman contracted syphilis while pregnant what chances did the child run of being infected in utero?* Up to the end of the fifth month, all did; during the sixth and seventh months, half did and half did not. During the eighth and ninth months, none did. Many of the infants who escaped infection *in utero* acquired syphilis by direct contact with their mothers soon after birth, and quite a large number of cases of so-called congenital syphilis were really cases of acquired syphilis.

(2) *If a woman contracted syphilis before becoming pregnant, how would it affect her future offspring?* Should such a woman have nine pregnancies, the first and last three were most likely to result in abortions, stillbirths, or in the birth of apparently healthy children who would show symptoms before the sixth week. Non-syphilitic children were most likely to be born in the middle. This was also true of a woman who conceived and contracted the disease from the embryo (conceptional syphilis). Although this was a general rule, it must never be forgotten that once a woman had borne a syphilitic fetus she was *ipso facto* herself syphilitic, and therefore capable of infecting all her future offspring, even if the father of the same had never had the disease. It followed, therefore, that a syphilitic woman should be treated throughout the whole period of each succeeding pregnancy, irrespective of the amount of treatment she had already undergone.

(3) *What effect on the child had treatment of its syphilitic mother?* Provided the mother underwent treatment throughout the whole term, or when the disease was first diagnosed, one might expect the birth of an apparently healthy child. Although he was unable to give the exact percentage the opinion he had formed during the last ten years was that the majority of these apparently healthy children were really syphilitic. They did not develop symptoms before the sixth week, as used to be the case in the pre-salvarsan era, but grew to be four years old or more, before they developed eye, ear, or nervous troubles which did not respond to treatment. The syphilitic child *in utero* might be so influenced by the treatment of its mother as to behave like an acquired syphilitic whose response to the disease had been cut so short by treatment so that when a recurrence appeared the lesion simulated a primary sore. He would pass round a painting of a syphilitic infant in which the first symptom to appear was a recurrent papule which took on the characters of a chancre, owing to its immunity having been destroyed by the treatment its mother underwent. He now made it the rule to treat for two to three years every child born of a syphilitic mother, however healthy at birth it might appear to be. Whether such a course would prevent the onset of "syphilis hereditaria tarda" the future alone would show.

(4) *Were pathological tests of any value in discerning which children were syphilitic and which were not?* It was the rule for children born of treated syphilitic mothers to be serologically negative and to remain so till clinical manifestations appeared, even if they did not appear for some years; therefore a negative complement fixation test could never be held as signifying that the child was not syphilitic. In cases in which the test was positive during the first months, treatment only very slowly rendered it negative and without

treatment it tended to become negative about the age of puberty. When the test became positive for the first time, three or more years after birth, it remained positive for the rest of the patient's life, irrespective of the amount of treatment he or she underwent. If a mother gave a positive reaction at the time of birth, the umbilical blood was usually positive as well, and even the infant's blood might be positive, although it was not necessarily syphilitic, as for instance when the mother contracted the disease at the eighth month. Therefore a positive reaction given by a child at or soon after birth was not proof positive that the child was syphilitic.

Summing up, in his opinion they would see less early congenital syphilis in the future but much more syphilis hereditaria tarda, especially cases of late congenital nervous syphilis. It was impossible to say yet whether treatment of both the mother and the child would prevent this. On the other hand, they were able to assert that pathological tests would neither help them in prognosis nor indicate to them whether a case was cured or not.

MR. HUMPHREY NEAME and MR. G. R. WOODHEAD

described the results of treatment in thirty-eight consecutive cases of interstitial keratitis. They stated that from the middle of 1919, patients with interstitial keratitis had been treated with intravenous injection of novarsenobillon or diarsenol, in combination with mercury by the mouth, as well as the ordinary treatment of the eye. The results, chiefly in terms of visual acuity, would be compared with those obtained in an inquiry by Igersheimer in 1913.¹ During the course of this investigation a few really unpleasant cases, in which intravenous injections of arsenical compounds seemed to have not the slightest effect in checking the downward progress of the eyes, made them rather pessimistic as to the value of this form of treatment. This had occurred with previous observers. A few really severe cases of this disease went from bad to worse, and led ultimately to almost complete blindness. However, as the result of an examination of all the cases treated during this period, excluding all new cases whose treatment had been begun within the last eight months, it was evident that the visual acuity was better than was expected.

Naturally, visual acuity was taken to mean a patient's best vision, with a careful correction of errors of refraction by retinoscopy where the translucency of the cornea permitted this. As a matter of fact, in this series all but one were still under the influence of mydriatics when their final vision was taken. So in most of them the reading should probably be higher than that shown. Furthermore, it was important to bear in mind that this series of cases contained a majority who had not yet attained to their best possible, by the absorption of corneal nebulae through the passage of time.

The diagnosis had been confirmed in a thorough re-examination made during the last few weeks, and only accepted in the presence of lines of old deep vessels in the cornea, as seen by two observers, with the presence of a blood Wassermann reaction positive on one or more occasions since the onset of the disease. The Wassermann reaction had been in all cases carried out by Dr. P. Fildes in the London Hospital Bacteriological Department. Three cases included in the series, with Wassermann reaction positive two or three times respectively, had shown, on final examination, corneal nebulae,

¹ Igersheimer, *Ophthalmoscope*, 1913, xi, p. 718.

but the presence of deep vessels had not been confirmed. Therefore their vision— $\frac{6}{6}$, $\frac{6}{9}$, and $\frac{6}{12}$ —was excluded from the chart of visual acuity.

Treatment had consisted in one, two or three courses of intravenous injections of novarsenobillon or diarsenol. Dosage was estimated according to age and size of patient, the standard for an adult male being from 0.6 up to 1.2 grm. of novarsenobillon or 0.45 to 0.9 grm. of diarsenol. Mercury by the mouth had been given simultaneously. Atropine in the form of drops or ointment had been applied to the eyes. There had been thirty-eight cases in

Number of patients

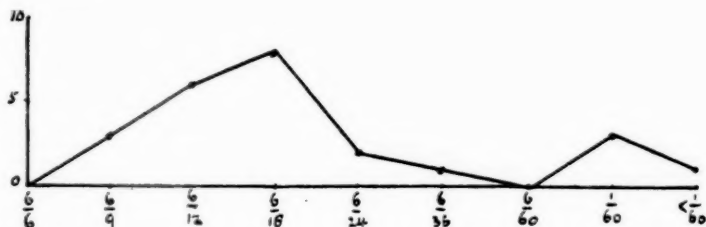


FIG. 1.

Vision of twenty-four cases treated as described. Note example: Patient with vision $\frac{6}{12}$ (3 letters) is classed in the group with vision $\frac{6}{18}$.

Number of patients

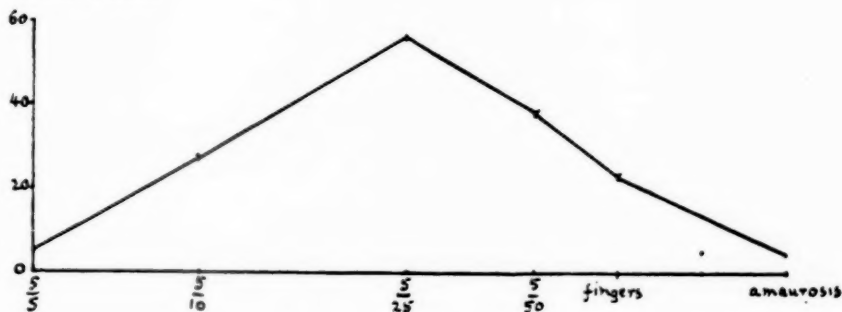


FIG. 2.

Vision: Igersheimer's series of 152 cases. (*Ophthalmoscope*, 1913, xi, p. 718.)

all: six cases had been lost, three of these with only one eye affected; three cases referred to above, of doubtful diagnosis, although Wassermann reaction was positive (these, if included, would definitely improve the resulting figures of visual acuity); three cases with one eye only affected as long as fifty-nine, thirty-two and fifty-two weeks after onset, respectively; two cases, illiterate children; twenty-four cases were therefore left for inclusion in the chart.

Igersheimer had 40.8 per cent. of his cases with ultimate vision of from $\frac{6}{36}$ down to blindness. His series was described as of cases "obsolete many

years." This implied that the vision had reached its best degree. Now $\frac{5}{35}$ vision was a slightly lower standard than their $\frac{6}{36}$, in the proportion of 6:7. Their series showed only five out of twenty-four (approximately 21 per cent. on the small series of twenty-four) as having vision of $\frac{6}{36}$ or worse. This calculation included seven old cases—in whom the disease had been established for over fifty-two weeks without arsenic treatment. If they put the worst possible interpretation upon the results and included six cases lost, two cases illiterate, and assumed their vision as being less than $\frac{6}{36}$, also three cases with one eye only affected, and took the vision of the affected eye, not considering the vision of the sound eye (i.e., light perception, $\frac{6}{12}$ and $\frac{6}{12}$ respectively), they had five out of twenty-four with vision less than $\frac{6}{36}$, and nine out of eleven with vision less than $\frac{6}{36}$, i.e., fourteen out of thirty-five with vision less than $\frac{6}{36}$, approximately 40 per cent.

It was hardly conceivable that the facts could be as above stated, particularly as three of the lost cases failed to attend or to reply, after the subsidence of the acute stage in one eye, the second eye being still unaffected.

Referring to some of the individual cases, the worst case of the series, the one case on the chart with vision of less than $\frac{1}{80}$ (No. 29, C.C.), had been intolerant to mydriatics in any form, so that the pupil remained small, the ciliary body failed to rest, posterior synechiae developed and the pupil became partly occluded by exudate.

The following cases were those in which the disease appeared to extend, or started in the second eye, during or after the use of arsenic injections:—

No. 3. A. B. Extension of the disease in the second eye while under treatment. The cornea became covered with haze in ten days. Right first, left three weeks later. Now right $\frac{6}{12}$, left $\frac{6}{12}$ (3).

No. 10. W. J. Appearance of the disease in the second eye after the second injection. A faint haze spread slowly over almost the entire cornea. Left eye first. Right $\frac{6}{12}$, left $\frac{6}{12}$.

No. 14. E. C. Right eye started about six months after left. As recently as February 9, 1921, there was lachrymation, photophobia and ciliary congestion in the right, vision then was $\frac{6}{60}$, left $\frac{6}{12}$. February 25, 1921: Still slight congestion; vision, right $\frac{6}{14}$, left $\frac{6}{12}$.

No. 18. R. H. Left eye started one month after third injection of novarsenobillon. Now right $\frac{6}{12}$, left $\frac{6}{6}$ (2).

No. 20. F. J. Right eye started four months after fourth injection, right eye still inflamed: vision, $\frac{6}{60}$, left $\frac{6}{6}$ (3).

No. 29. C. C. Persistent extreme corneal vascularization. Intolerance to mydriatics. Vision above.

No. 39. G. P. Right eye started four months after left, and six weeks after three injections had been given. In ten days a haze spread down half way over the cornea, and extended gradually all over. Pain and fluctuating swelling appeared in the right knee a few weeks later. Right $\frac{5}{60}$, left less than $\frac{5}{60}$.

Summary.

(1) Could arsenic preparations of good quality, combined with mercury, prevent the second eye from becoming affected, in patients who came for treatment before both were involved? It had not, in this series, prevented five cases from suffering this calamity. Three still had one eye not involved. It was questionable whether they would remain so.

(2) Was it likely to prevent other complications, such as choroido-retinitis, from arising? The evidence on this point also was insufficient. In this series there were five cases with this complication. Three of these were old cases (Nos. 16, 28 and 30); one had been under treatment for interstitial keratitis in one eye, the other having been diseased six years before (No. 2); the last had the disease and was treated at the London Hospital by other means for nearly a year before arsenic injections were given. Of the rest of the series, there were only three in which choroiditis might be present in the posterior part of the eye without detection. In them the cornea was too opaque for a view of the fundus (Nos. 29, 36 and 39). It was probable that the arsenic preparations had an effective action on the choroid, on the ground that the latter was a very vascular structure.

(3) Did it have any effect on the interstitial keratitis that was established? From the visual acuity noted in this series of cases, and from Wallis's experience in 1913,¹ it appeared that arsenic preparations had some effect in improving the final vision and in its more rapid attainment. They had the visual acuity results in 152 cases treated by previous methods. A series of as many or more was required to give a sure indication as to the efficacy of arsenic in this condition. There must by now be considerable numbers of cases that had been treated vigorously with arsenic injections in different large hospitals. It ought to be possible to trace several hundred cases so treated, and by combined action obtain large data for comparison with previous methods.

(4) With the growth of prophylactic treatment during pregnancy it was possible that the incidence of interstitial keratitis with other manifestations of congenital syphilis would dwindle.

Acknowledgments were due to Mr. Roxburgh, Mr. Goulden and Mr. Jeremy for permission to report on their cases at the London Hospital.

Mr. A. T. PITTS,

referring to the subject of the teeth in congenital syphilis, said that since the time when Jonathan Hutchinson first described them congenitally syphilitic teeth had had a diagnostic value. Since the introduction of the Wassermann reaction they were no longer so completely dependent on the clinical manifestations of syphilis for diagnosis, but the presence of certain dental dystrophies peculiar to congenital syphilis was still a sign of considerable positive value. The teeth which showed characteristic modifications were the upper central incisors and the first permanent molars. The former were first described by Hutchinson in 1858, while the latter seem to have been first recorded by Moon, the dental surgeon to Guy's Hospital, in 1878; they were often spoken of as "Moon's molars."

Hutchinson's description of the incisor teeth still held good and could scarcely be improved upon. Hutchinson stated that the tooth was dwarfed both in length and width, the angles at the cutting edge were rounded off so that the tooth was narrower at the cutting edge than at the gum margin. There was a shallow notch on the cutting edge more or less crescentic in shape. The centrals were usually spaced. Thus there were two elements in a typical "Hutchinson" incisor: the narrowing towards the tip and the notch. The first indicated an alteration in the whole architecture of the tooth and would

¹ G. F. C. Wallis, *Ophthalmoscope*, 1913, xi, p. 342.

suggest that before calcification commenced the cells of the tooth-germ were affected by the syphilitic virus. With regard to the notch Hutchinson stated that when the tooth was first erupted there was a crescentic area of badly formed enamel which soon wore away, leaving a notch. This would seem to be a true hypoplasia due to some interference with calcium metabolism and comparable with the hypoplasia seen in rickets and other disorders of childhood. Mr. Dolamore had suggested that this might not be an essential part of the syphilitic manifestation but might be due to some intercurrent illness or malnutrition. If this were so they should expect to find teeth showing a narrowing towards the cutting edge, but with no notch. Possibly this might be so, for it was certain that there must be many variations from the typical "Hutchinson" tooth, all due to syphilis, but yet not sufficiently distinctive to be of diagnostic value. The difficulty of working out these points was, however, very great.

In a valuable article in the *Dental Cosmos* for 1913, Stein stated that there were four stages in the life history of a syphilitic tooth. First, the tooth on eruption presented a diminution in breadth with an area of badly formed enamel at the cutting edge; secondly, this area became worn, leaving the typical notch; thirdly, the notch became obliterated by further wear so that only a slight bevel on the anterior edge of the tooth indicated its former existence, though the tooth still retained its screwdriver shape in lessened form; fourthly, still further wear might ensue to the extent of obliterating the notch and so much of the tooth, that its diagnostic value would have vanished. The two last stages might not be reached if the position of the teeth and their relation to the other teeth did not lead to extensive attrition or wearing down of the teeth generally.

This grouping of the life history of the "Hutchinson" tooth into four stages was attractive, but it must be admitted that the clinical history was not absolutely conclusive. To prove it, it would be necessary to take a large number of models or photographs of these teeth at stages beginning with their eruption and carried on to adult life. This was not easy to do, and so far as he knew it had not been done. In the majority of cases these teeth showed a notch when they first came under notice, but it would be wise to remember that there might be an earlier stage when the tooth was freshly erupted in which the notch was absent. An undue insistence on the notch as a *sine qua non* might blind the observer to the significance of a tooth unnotched but with a marked narrowing towards the cutting edge. A case in point was that of a boy, aged 8 years 10 months, who had lately attended the dental department at Great Ormond Street. He had not been sent on by any member of the staff but attended only for toothache. On examining his mouth he (Mr. Pitts) noticed that the left upper central incisor, which was the only incisor present, showed a distinct narrowing toward the cutting edge; there was no notch; the cutting edge was uneven. The enamel was of good quality. The tooth was only partly erupted. The first permanent molars showed a curious condition which he had not seen before, as the anterior cusps had the typical stunted appearance seen in the dome-shaped molars (soon to be described), but the posterior cusps were normal. The bridge of the nose was somewhat depressed although it could not be said that the boy had the typical facies of congenital syphilis. The mother informed Mr. Pitts that he had had "snuffles" at about the age of 3 or 4 years, and also sores at the angle of the mouth at about the same age; this she put down to the child having sucked the dummy of another child. There were five other children in

the family, all healthy; there had been no deaths nor miscarriages. In spite of the absence of confirmative history, the teeth were so suggestive that Mr. Pitts thought it worth while to have a Wassermann reaction done and Dr. Nabarro informed him that it was strongly positive. It was sometimes stated that the enamel was badly formed and discoloured. In his experience, however, the enamel was usually normal, and these teeth showed no greater liability to caries than any other teeth. Hutchinson made this point clear, for he stated that when the enamel was defective it was usually due to the use of mercury. The view that mercury was a cause of hypoplastic teeth was now not generally held, but if for Hutchinson's conception of the effect of mercury on the teeth they substituted the modern view that hypoplasia was due to interference with calcium metabolism and might be caused by any disease or malnutrition during the period of calcification, either directly or by affecting the ductless glands, then Hutchinson's careful discrimination of the different types of teeth seen in syphilis and other diseases still held good. Indeed in the sixty odd years which had elapsed there had been little to add to Hutchinson's observations. The lateral incisors of the upper jaw and the lower incisors might also show the characteristic shape, but much less commonly and only rarely without the upper centrals being affected, so that these teeth still remained in Hutchinson's words the "test teeth."

The first permanent molars might show a special type of malformation in congenital syphilis. These appeared to have been first described by Moon in the *Transactions of the Odontological Society* in 1877. These teeth also showed a diminution in breadth towards the masticating surface so that in common with the incisors they shared the characteristic alteration in their architecture. The cusps, instead of being well-formed and cone-shaped were stunted and rounded. Moon described them as "dome-shaped." An American writer had recently described them as the "mulberry" molar. These two terms in conjunction well described the two typical features of these teeth. Hutchinson, with perhaps a natural bias in favour of the incisors, did not regard them as such typical teeth for diagnostic purposes, yet their appearance was equally characteristic. The permanent molars more than any other teeth were liable to be affected by disease and the resulting hypoplasia might vary from a slight pitting of the enamel to an extensive destruction of the masticating surface. There should be no difficulty in distinguishing between the two types. In syphilis the molar, seen from a side view, was dome-shaped, almost conical in fact, and without the bulge of enamel usually present. The masticating surface was a flat plateau on which the rounded stunted cusps were stuck like small beads. The hypoplastic tooth, being a normal tooth defectively calcified, showed a bulge of enamel on side view and the cusps were prolonged upwards from the body of the tooth with deep intervening fissures. The enamel was badly formed so that the cusps were often discoloured and owing to the loss of tissue they were sharp, irregular and pointed. As in the case of the incisors, Moon's molars were usually well calcified teeth.

Another sign of congenital syphilis had been described by Sabouraud which was said to affect the upper first molars only. A full account of it would be found in *La Presse Medicale* for March, 1917. It consisted of an accessory cusp on the internal or lingual surface of the upper first molars at the anterior corner. Sabouraud stated that "in the majority of cases it existed alone, no other dental stigmata of congenital syphilis being present in the same subject. This malformation which is frequent, and often exists

alone in a mouth the dentition of which is otherwise regular and normal, can be regarded by itself as a certain sign of congenital syphilis." In spite of Sabouraud's reputation, he (Mr. Pitts) did not think this alleged sign need be taken very seriously. Martoux had found the cusp present in seven cases of tuberculous soldiers, none of whom had any history of congenital syphilis. Two of them yielded a positive Wassermann reaction but this was due to acquired syphilis. Martoux also quoted Mozer and Cheret, who found the extra cusp present in nineteen children, all of whom gave a negative Wassermann. This cusp was often called the tubercle of Carabelli by Continental dentists and had been recognized for many years as one of the commoner forms of abnormality in the shape of the teeth. It varied from a slight elevation on the surface of the tooth up to a well-formed cusp. Bolk, the Dutch anatomist, who had devoted much time to the study of tooth forms, found this accessory cusp present in 27 per cent. of cases and that in another 40 per cent. the site of the cusp was indicated by a groove. Such a high percentage clearly showed that it was an anatomical not a pathological variation, and that it was without any pathological meaning. It was of interest to note that the same variation was sometimes found in the upper second deciduous molar. This fact, which seemed to have escaped Sabouraud's observation, was an additional disproof of his statement.

With regard to the milk dentition, although these teeth presented a variety of conditions, it was doubtful whether there were any conditions which could be regarded as truly pathognomonic of congenital syphilis, although they might be suggestive. A few cases of "Hutchinson" teeth in the milk dentition had been recorded. Such cases must be extremely rare. Parrot had described the condition as occurring in twenty-seven cases; he, however, regarded rickets as a syphilitic manifestation and it seemed to him (Mr. Pitts) that his statements about the teeth should be accepted with considerable reserve. Dr. Still had recorded a case in a male baby aged 14 months with incisors of "typical screwdriver shape, narrower at the cutting edge than at the base: a well-marked notch and undue separation." There was no other evidence of syphilis but the family history was suggestive. In the face of this circumstantial account the possibility of "Hutchinson" teeth in the deciduous dentition must be admitted. It must be remembered that the calcification of the deciduous incisors commenced at the sixteenth to the eighteenth week of intra-uterine life and that the peculiar shape of these teeth dated from the commencement of calcification. Syphilis attacking the foetus at that early stage would be more likely to cause its death; probably that was the reason why such a dental manifestation in the milk dentition was so rare. Although he had watched for it carefully, out of several thousand children he had never seen a case. Yet providing the foetus survived and that the infection occurred early enough there was no valid reason why "Hutchinson" teeth should not occur in the milk dentition. On a few occasions he had seen upper milk incisors with notches which were due to caries. Here was a pair which he removed recently; the notch was well marked and it might be possible to mistake them for "Hutchinson" teeth though obviously they were normal teeth partly destroyed by caries. He would suggest that some of the examples of "Hutchinson" teeth recorded in the deciduous condition might really have been cases of caries similar to the pair he was showing.

In an exhaustive article in the *Dental Cosmos* for 1908, Cavallaro had described various dental stigmata of congenital syphilis in the deciduous dentition, and regarded undue spacing, gemination of teeth, supernumerary

teeth and irregularities in the times of eruption as all pathognomonic of syphilis. This was casting the net too wide. All these conditions could be found in children not syphilitic, and the test of a dental dystrophy due to syphilis, and therefore of value as a diagnostic sign, was that it did not occur in healthy children or in those suffering from other diseases.

One condition found in the milk teeth was of some interest and was undoubtedly associated in certain cases with congenital syphilis, namely hypoplasia. It was rare, for out of about 4,000 children he had only been able to collect twenty cases. Now hypoplasia must be caused by factors operating before birth, and of the diseases affecting the foetus syphilis was undoubtedly the most important. It was therefore reasonable to suppose that syphilis must be one of the conditions which caused defective development of the deciduous teeth. There must however be other causes, such as malnutrition of the mother during pregnancy, a lack of vitamins in the maternal diet, and thyroid insufficiency in the mother. All these conditions must be common, especially in women of the poorer class, and yet hypoplasia of the deciduous teeth was very rarely found, which suggested that its cause must be a somewhat serious interference with the calcium metabolism of the foetus. It was interesting to note that out of his own cases four occurred in congenital syphilitics and that in these the hypoplasia was especially well-marked. He did not investigate the history of the other cases from that point of view but he proposed to have a Wassermann test done in future cases, and he would not be surprised if the incidence of syphilis in cases of hypoplasia of the milk teeth proved to be considerably higher. Without being dogmatic on such scanty evidence he suggested that on *a priori* grounds congenital syphilis should be regarded as one of the causes of hypoplasia of the milk teeth and that any well-marked case of such hypoplasia should arouse a suspicion sufficient to warrant a further investigation.

Dr. RONALD CARTER

spoke from the general practitioner's point of view. He thought the profession were getting a little nervous and "jumpy" in regard to congenital syphilis. The general public could not escape receiving information on the subject from the daily Press, and so the general practitioner was often questioned with regard to the frequency of the disease amongst the population. He had been twenty-five years in general practice, and during the last fourteen years he had worked at Infant Welfare Centres. His impression was that congenital syphilis was a comparatively rare disease. Dr. Routh¹ read a paper in November last in which he referred to the frequency of congenital syphilis in industrial cities. He then quoted a set of statistics given by Dr. Helen Campbell, Chief Medical Officer of the Infant Department of Bradford Health Committee, on the effects of congenital syphilis on infantile mortality in Bradford in 1918. Of 2,172 infants under observation in 1918, 1,606 were registered during the year, and of these 148 died, 107 out of the 1,441 legitimate children and forty-one out of 165 illegitimate. Of these 148 infantile deaths, 120 were those of syphilitic infants, 81·08 per cent. of the total deaths. Of the 107 legitimate children who died eighty-three (77·5 per cent.) had congenital syphilis, whilst out of the forty-one illegitimate who died thirty-seven (90·2

¹ *Proceedings*, 1920, xiv (Sect. Obst. and Gyn.), p. 216.

per cent.) had syphilis. Dr. Campbell showed that these startling figures were due to the fact that congenitally syphilitic infants were peculiarly selected for attacks by respiratory, gastro-intestinal and specific infections such as measles, which killed them in much larger numbers than infants not so affected.

Dr. Carter pointed out that no pathological findings were advanced to support that assertion, and that therefore all Dr. Campbell's statistics were worthless. He was surprised that so eminent an authority as Dr. Routh should be misled by such untrustworthy evidence in estimating the frequency of congenital syphilis amongst the general population. Greater care should be exercised when presenting these statistics.

The PRESIDENT (Dr. F. LANGMEAD)

said it was not his intention to review the whole subject under discussion, but he thought it had been of special value along certain lines. With regard to diagnosis, the subject, on its medical side, had been referred to chiefly in connexion with the Wassermann reaction. There seemed to have been a general consensus of opinion among the speakers that a positive Wassermann was good evidence in favour of syphilis after a short time from birth. Considerable difference of opinion had been expressed as to the value of a negative Wassermann finding, the balance of judgment seeming to be that a negative Wassermann did not constitute good evidence, though it had some value. An important point which was made by Mr. Addison was the great value of radiography in arriving at a diagnosis of congenital syphilis, especially that of a surgical kind. Mr. Addison emphasized the fact that in syphilitic epiphysitis there was present a widespread bone disease, a fact which that gentleman had amply demonstrated in his opening contribution, and which hitherto had not received its due recognition. He did not feel he was in a position to say very much about Sir Humphry Rolleston's opening address; both Sir Humphry and Dr. Morley Fletcher had made a series of important suggestions as to the way in which syphilis might produce disease unassociated with the Wassermann reaction, and they had both stimulated investigation along the lines of considering the relation of syphilis to infective disease, ductless gland disorders and diseases in other viscera. Such a stimulus was much wanted, but no doubt both would agree that some time must elapse before dogmatic assertions could be made on the points raised. Most important of all, perhaps, was the consensus of opinion which this debate had brought out as to the paramount importance of treating the syphilitic pregnant mother. If the discussion had done nothing more than emphasize this, it would have been amply justified.

SIR HUMPHRY ROLLESTON (in reply)

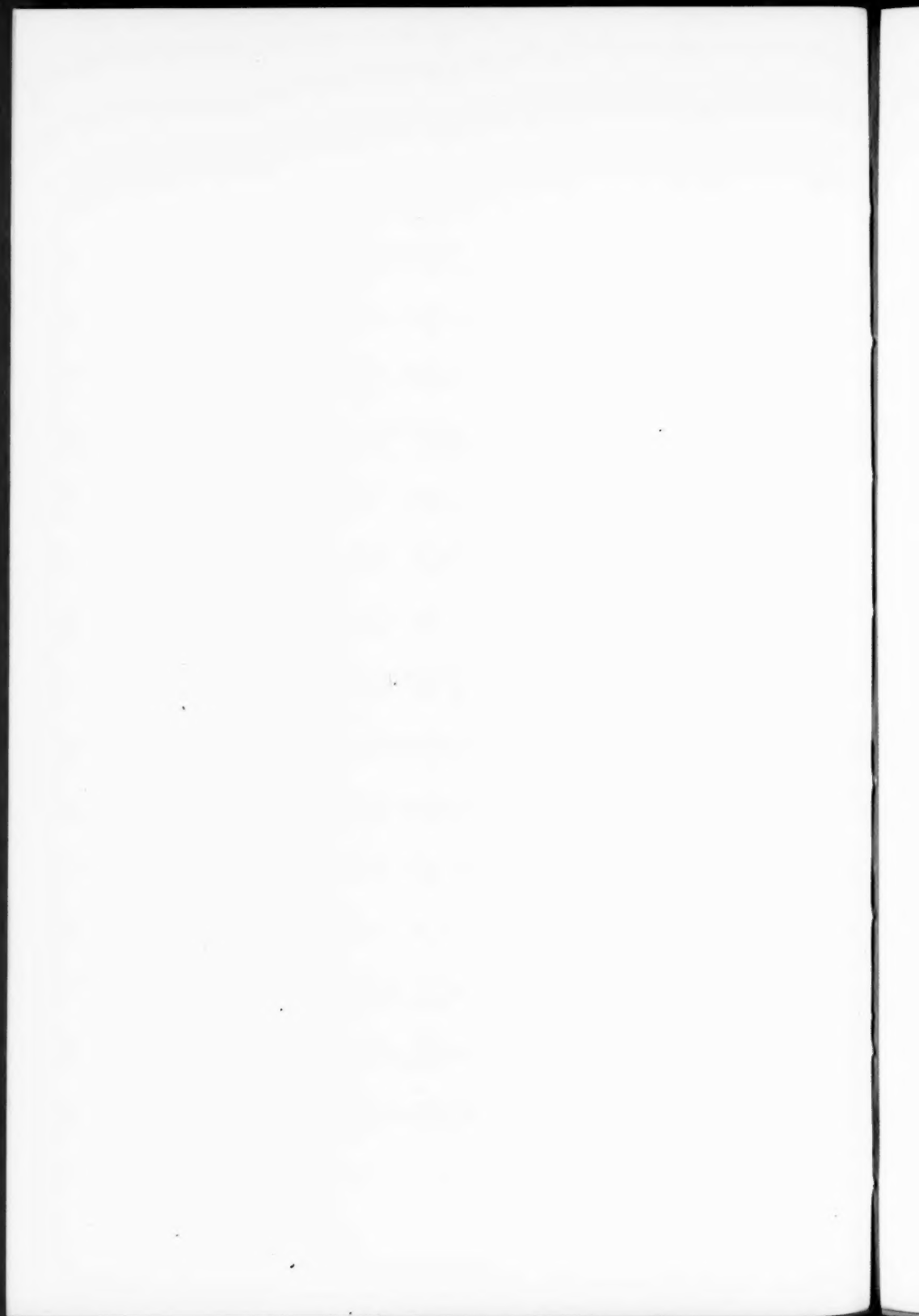
said his first impression was the value of the debate, and particularly of the communications of Mr. Bishop Harman, Mr. Neame, and Mr. Pitts, dealing with their special subjects. The incidence of the disease had revealed a considerable difference of opinion. Dr. Findlay, speaking from his Glasgow experience, believed that congenital syphilis was becoming rarer, and this view was supported by the observations which were made on the Wassermann reaction at the East End shortly before the war by Dr. Fildes at the London Hospital. Closely bound up with this was the question of change of type, and here the Section had had the advantage of Dr. Morley Fletcher's

experience of over twenty-five years, pointing to a change which might possibly be explained, by an alteration in the strain of spirochæte from one that specially attacked the skin, to one which attacked the viscera and the nervous system. This also seemed to be borne out by Mr. McDonagh's statement as to the frequency of cases in which the early stage of syphilis had been missed altogether, the tardive or late manifestations being the first recognized.

He regretted that more was not heard from Mr. McDonagh, especially as to a provocative dose. The only speaker who touched on this point was Dr. Morley Fletcher, who frankly stated he had not met with a case in which such a dose had really proved provocative in a child. With regard to the cerebro-spinal fluid, there were of course considerable difficulties associated with performing lumbar puncture widely in children, and the few observations which had been made on that did not lend much support to the thesis that some cases of congenital syphilis, particularly those attacking the pituitary body, might be missed because the blood Wassermann only was examined. With regard to the endocrine glands, which though speculative might eventually prove of considerable importance, Sir F. W. Mott said that in the cases in which he had examined the pituitary body he had failed to find the spirochæte in the gland. The other speaker who referred to the endocrine glands was Mr. Pitts, who raised the interesting question whether syphilis, attacking the parathyroids and so disturbing the calcium metabolism, might account for diseases of the teeth. On that point more would be learned later on.

There was, further, the interesting point as to the way in which syphilis and acute infections interacted. Dr. Morley Fletcher pointed out that in some cases a bronchiectasis and fibrosis of the lung might be explained by the presence of syphilis whose manifestations were otherwise latent. A related point was the way in which acute infections might stir up latent syphilis and bring out the ordinary manifestations of the disease. He agreed with Dr. Morley Fletcher that though it was possible for syphilis to act in complicated ways in producing granular kidney, through the glands, there was yet no proof available that this was the case.

The general feeling of the vital importance of the ante-natal treatment of syphilis and the satisfaction evoked by Dr. Findlay's 100 per cent. successes had only been modified by Dr. Routh, whose very great experience did not fully support such a cheerful view. The profession had perhaps been rather afraid of pushing mercury in infants and children to the extent which was desirable, and Dr. Morley Fletcher had done much service in insisting on this point.



Section for the Study of Disease in Children.¹

President—Dr. FREDERICK LANGMEAD.

A Condition somewhat resembling Lupus Pernio in a Child.

By F. PARKES WEBER, M.D.

[FOR the account of the case see the *Proceedings* of the Section of Dermatology for April 21, 1921, p. 77.]

Case of Renal Dwarfism.

By C. MAX PAGE, D.S.O., M.S.

PATIENT, V. B., girl, aged 7½ years, has been weakly all her life. Reared on Nestlé's milk. Able to walk at about 2 years of age and till now has had no serious illness.

Family history: Father and three sisters said to be healthy. Mother died three months ago of cancer.

History of present illness: Admitted to Victoria Hospital, November 1, 1920. Said to have been walking lamely and with difficulty for two months. During same period general health appeared poor; occasional attacks of vomiting. No injury to legs or arms and had not complained of pain.

State on admission: height, 42 in.; weight, 31½ lb. Appeared poorly nourished; complexion sallow. Head appeared large and somewhat cuboidal in shape. Musculature generally poor; skin of whole body showed dull yellow pigmentation and was dry and inelastic. Drowsy and apathetic; talked very little but appeared to understand what was said to her. Appetite poor. No abnormalities detected in the thoracic or abdominal organs on physical examination.

The urine passed averaged 50 oz. in the day. Reaction acid and the specific gravity about 1015. Faint cloud of albumin sometimes shown on boiling. No other abnormality detected by means of usual tests.

The following particulars have been furnished by Professor MacLean, who made a full examination of the renal function at St. Thomas's Hospital: "Urine sometimes free from protein but generally a fair amount present. A few hyalo-granular casts were occasionally found. Urea concentration of twenty-four hours' specimen of urine = 0.8 per cent. Concentration of urea in urine after giving 7 grm. of urea: one hour after = 0.8 per cent.; two hours after = 0.85 per cent. Diastatic reaction < 2 (normal 6 to 20). Blood urea: first occasion, 143 mgr. per 100 c.c.; second occasion, 147 mgr. per 100 c.c. (normal, 20 to 40 mgr.)."

¹ At a meeting of the Section, held April 22, 1921.

Thursfield : Case for Diagnosis

Osseous system : Wrists showed radial and backward displacement of the hand suggestive of displacement of radial epiphysis ; X-ray appearance confirms this diagnosis.

The knees showed condition of severe genu valgum. An X-ray demonstrates that there has been complete backward dislocation of the lower epiphysis of femur.

X-rays of all long bones showed changes at the epiphyses generally regarded as characteristic of adolescent rickets.

Spine showed slight scoliosis and there was some beading of the ribs.

Examination of optic discs did not show any retinal change.

Blood examination showed changes of secondary anaemia : white cell count, normal.

Wassermann reaction negative on two occasions.

Remarks.—This case is of interest on account of the extreme degree of bony deformity resulting from the displacement of the epiphyses of the femora. Both these displacements and those at the wrist-joint apparently occurred spontaneously ; there is no history of injury or pain in association with the changes.

It is also noteworthy that specimens of urine taken on many days would pass as normal if only submitted to the ordinary tests. The possibility of the condition being due to or associated with renal disease was suggested by Sir Humphry Rolleston who kindly examined the case for me. It has been classified as a case of renal dwarfism on account of the result of the full examination of the renal function quoted above. The activity of the kidneys was shown by these means to be so poor that there is little doubt that any operation under anaesthesia would produce a fatal uraemia.

The general condition of the patient has improved very remarkably while she has been in hospital without any special treatment being adopted. She has gained nearly a stone in weight in the course of three months and is always relatively alert and cheerful. The deformity of the knees is less obvious than it was. I assume, however, that the expectation of life is poor and operative treatment to remedy the deformities is not justifiable. I propose to allow her to remain in a corrective splint for six months or more.

Three fatal cases of this character were reported with detailed pathological findings by Dr. Paterson, in April of last year to this Section [1]. He gives a review of the English literature on the subject. Cases of the same nature have also been shown recently by Dr. Morley Fletcher [2], and Mr. Fairbank [3].

REFERENCES.

- [1] PATERSON, *Proc. Roy. Soc. Med.*, 1920, xiii (Sect. Study Dis. Child.), p. 107. [2] MORLEY FLETCHER, *ibid.*, p. 118. [3] FAIRBANK, *ibid.*, 1921, xiv (Sect. Surg., Sub-sect. Orthop.), p. 28.

Case for Diagnosis.

Shown by G. S. TROWER for HUGH THURSFIELD, M.D.

D. F., BOY, aged 6, was admitted in February to Great Ormond Street Children's Hospital, on account of contraction of the muscles of the left calf and changes in the skin of the back and face. The prenatal history, infancy and early childhood seem to have been normal. He is one of a family of five

and there is a history of one miscarriage at the end of the series of children. He had no illnesses till April, 1920, when he was first noticed to be walking on the toes of the left foot, a condition which has gradually become more marked. About this time he had measles, apparently after the affection of the left leg was noticed. Soon afterwards he had a small irritating red patch on the back which was followed by others on the back, neck and face, their appearance covering a period of about eight months. The later patches do not seem to have been irritating and both at the time of appearance and since he has been under observation there has never been pain, or œdema of the skin. The condition of the left leg led to the suspicion of tuberculosis of the hip for which he was under observation at a local hospital.

On admission he was found to have typical patches of scleroderma on the back, face and neck, the skin was hard, discoloured and shiny and bound in a varying degree to the subjacent tissue. There is a small patch on the scalp from which the hair is absent. On both legs and to a slight extent on the extensor surface of the arms the skin, though normal in appearance, is difficult to pick up. There is limitation of the movement of the fingers. The nails are normal. The calf muscles on the left side are firmly contracted and the tendo Achillis bound down. The intercostal muscles are almost immobile. Diaphragm moves well. The right side of the tongue is atrophied. The spleen is apparently enlarged and felt two fingers' breadth below the costal margin. The edge of the liver is clearly felt. Premature contractions of the heart were noticed on admission but these are now much less frequent. The tonsils are large and he has had a short attack of tonsillitis while in hospital.

He was given salicylates over a period of about six weeks without any obvious change. For the last month he has been given iodine and potassium iodide by the mouth. As local treatment he has had daily massage and inunction first with zinc oxide ointment and lately with iodoform ointment of certain of the patches, others being left untreated as controls. Without doubt there has been great improvement in the patches treated, and the iodoform seems to have most effect. The Wassermann reaction is negative. The urine is normal. The blood has not been examined. No X-ray photographs of the bones were taken, but screening did not reveal any abnormality. Except during the tonsillitis mentioned there has been no pyrexia. No fresh patches have appeared and there has therefore been no opportunity of observing them at their commencement. As improvement takes place the skin at the outer edges becomes white.

The points in question are whether the muscles or the skin were affected first; what is the nature and cause of the change and what is the prognosis?

DISCUSSION.

Dr. HUGH THURSFIELD said that, for comparison with the case just described, he had brought a girl from St. Bartholomew's Hospital, 16 years of age, who had early skin lesions of scleroderma, without muscle involvement in the trunk and arms, but with marked hemiatrophy of the right side of the face and right half of the tongue. In the region of the chin and lower jaw in particular the whole of the subcutaneous tissues seemed to have disappeared, and the skin appeared to be tied down, more or less to the periosteum. There was a definite history of the condition having started only five months ago; and a portrait showed that two years ago there was no abnormal appearance. She had no pain. He thought this case was fully comparable with that just described, but in the girl was less developed than in the boy. With regard to ætiology, he held that it was a generalized disease, probably in the nature of an

infection, and that the degree of involvement of muscles and skin depended on the dose of the infection and the amount of resistance to the infection. From time to time older people could be seen to have developed the same sort of disease; it specially affected women of from 40 to 50 years, in whom it commenced in the face and spread slowly down over trunk and arms, subsequently clearing up again. During the last two years he had had two cases of that type. One of the patients was now almost entirely well, whereas eighteen months ago her face was a mere mask, and she could not move the separate muscles at all. The late Dr. F. E. Batten had carefully investigated a case of what was called "dermato-myositis," in which there was a marked inflammation of the skin, together with a very chronic and definite inflammation of muscles in the greater part of the trunk and limbs, and the child gradually wasted and died. Dr. Batten made very elaborate histological examinations of the nerve tissues, muscles and skin, and concluded that it was probably an infection, beginning in muscles, and secondarily involving the skin. He (Dr. Thursfield) thought it possible that these cases of scleroderma which were seen from time to time represented a chronic generalized infection infecting or affecting practically all the tissues of the body, because others had shown cases in which the bone had been involved. He would place dermato-myositis in the same group as scleroderma.

Dr. F. PARKES WEBER thought chronic cases such as this were more likely to be due to some endocrine disturbance than to an actual infection, and therefore he would try such remedies as thyroid, though a good result could not be hoped for in every case. Some got better of themselves, and it might be said that that showed that an infection had been overcome, but others might assert that an endocrine disturbance (temporary) had been compensated for. The term "dermato-myositis" should hardly be applied to such cases, because the term suggested acute or sub-acute dermato-myositis of the "pseudo-trichinosis" kind. If one could be sure that the muscular condition in cases like that shown by Mr. Trower was inflammatory, he (Dr. Weber) would prefer the term "myositis fibrosa."

The PRESIDENT expressed his satisfaction that these cases had been brought forward, as several had been seen which resembled each other in many ways, though differing in detail. It was desirable to study cases of the kind in order to arrive at some general conclusion concerning them. Dr. Thursfield had come to one conclusion—namely, that dermato-myositis should be placed in the same group as scleroderma. He (the President) was still doubtful on the point, because many examples of dermato-myositis had been very acute, and had proceeded rapidly to a fatal termination; moreover such definite nerve changes had been found that the name "dermato-neuro-myositis" had been applied to them. He agreed that scleroderma was a very general disease, and that structures other than skin were frequently involved. Addison, who first described cases of scleroderma, mentioned involvement of muscles as a distinct part of the picture, a fact which seemed to have been somewhat lost sight of.

Dr. THURSFIELD (in reply) said that there was no chronic disease of a general character—exophthalmic goitre, diabetes, gout, rheumatoid arthritis—which had not been recorded as being accompanied by scleroderma and myositis, showing that the condition was protean, accompanying any sort of disease which was infectious or (possibly) metabolic. He quite agreed that endocrinal disturbance did not preclude infection, nor vice versa. The general character of the whole disease seemed to strongly point to its being a generalized disease of a progressive, sometimes a retrogressive, type, behaving much like some chronic infections, such as tubercle, breaking out again unexpectedly when it seemed to have been cured, and in the case of dermato-myositis not infrequently progressing to death. There was also enlargement of spleen and liver, and some of these cases of scleroderma with myositis had definite attacks of fever, quite apart from tonsillitis.

Congenital Heart Disease without Bruit.

By FREDERICK LANGMEAD, M.D. (President).

D. S., FEMALE, aged 2 years 1 month. The girl has been blue and dyspnoic since birth, and clubbing of the fingers and toes is pronounced. The case is clearly one of congenital morbus cordis, but no bruit can be heard. The diagnosis is regarded as being either that of pulmonary stenosis or of transposition of the great vessels.

Case of Congenital Heart Disease.

Shown for W. J. PEARSON, D.S.O., M.D., by FREDERICK LANGMEAD (President).

K. B., FEMALE, aged 9 months, was first brought for treatment on account of "bronchitis." The child is somewhat small and looks delicate and its muscles are flabby. There is neither cyanosis nor clubbing. The liver reaches one and half finger-breadths below the costal margin and the spleen is palpable. Heart: Maximum impulse, fifth space, just outside the nipple line. The area of impulse is large and there is a marked thrust in the third and second left spaces with a thrill in the second left space. A systolic bruit has its maximum in the pulmonary area and inner end of second left space, and is also clearly heard at the apex. The second sound in the pulmonary area is accentuated. A skiagram is shown; it reveals considerable enlargement of the heart with prolongation upwards to the left of the sternum.

The PRESIDENT discussing Dr. Pearson's case favoured the view that it was a case of patent ductus arteriosus with a systolic murmur in the second left interspace instead of the better known double or waterwheel murmur.



Section for the Study of Disease in Children.¹

President—Dr. FREDERICK LANGMEAD.

The Diagnosis of a Case of Renal Calculus in a Child.

By HUGH THURSFIELD, M.D.

THIS case illustrates what is, I think, one of the most difficult symptoms to interpret correctly—namely, persistent or recurrent hæmaturia in a child, which is painless and often otherwise symptomless. The history of this case also illustrates a series of mistakes on the part of most of us who saw the child, and offers a striking example of the obsessions which may beset ordinarily intelligent people if they once lower their guard.

The child was a girl, aged 10 years, who was admitted last October, with a history of recurrent painless hæmaturia during the previous eight months. At times she had had some œdema of the feet, face, abdomen, and right ankle. Her urine contained blood, albumin, blood casts and epithelial casts. She had a systolic blood-pressure of 124, and she was sent in with the diagnosis of nephritis. That proved to be my obsession; I accepted the diagnosis without question. It seemed to me that the history of the œdema of face and legs, the somewhat high systolic pressure, and the general appearance of the child, constituted legitimate ground for acceptance. When she was in bed, her œdema quite disappeared, but the urine continued to contain traces of blood. She passed a fair quantity of blood: the urine was passed freely, without pain at any time. A week after she came in a few pus cells were found in the urinary deposit, and cultures were attempted from sterile specimens, but nothing was grown from them.

Then I began to have some doubt about the diagnosis of nephritis, and I suggested to my surgical colleague a cystoscopic examination. Shortly afterwards, on going over the child in examination one day I found what I believed to be a displaced kidney in the right loin; there was no doubt a tumour there. My surgical colleague at first refused to accept the fact of the presence of a tumour, but I persuaded him to see the patient with me, and he then thought the tumour was probably a small mass of glands in the mesentery; it was rather low down, on the right side. At this time there was but little hæmaturia, and he suggested that if we wanted him to make a thorough cystoscopic examination we should get the child up and let her run about the ward, to see if she would pass rather more blood. She had been on milk diet up till now. She was allowed up, and within four days the quantity of her urine had steadily diminished; on the fourth day she passed only 5 oz., and she had an attack of vomiting, headache, collapse and twitching, symptoms which were diagnosed as uræmic. The next day her hands were in the typical tetany position. She was put back to bed and her milk diet resumed, and rather more than a month after her admission she was skiagraphed, and a mass was seen in the right side, rather far out and somewhat low down, which was believed by some to be a calcareous gland. But we were not quite satisfied with that diagnosis, particularly as the hæmaturia still went on. The surgeon declined to operate on the evidence of what we knew; he was particularly afraid of the uræmia.

¹ At a meeting of the Section, held May 27, 1921.

The next proceeding was, that my house-physician collected a twenty-four hours' specimen, and had it examined in the pathological laboratory for tubercle bacilli, and, to my disgust and amazement, the presence of tubercle bacilli was reported. I went down to the laboratory myself and asked to see the specimen, but it could not be found. The pathologist, however, had no doubt they were genuine tubercle bacilli, he was particularly certain that they were not smegma bacilli. That, again, gave us pause. A few days later, cystoscopy was done, and it showed the right ureteric orifice to be perfectly normal, but the left ureteric orifice was said to be somewhat dilated. Then my house-physician carried out a series of urea-concentration tests, but they did not give us very much information, there appeared to be a practically normal reaction. Further examinations of catheter specimens of the urine failed to confirm the presence of tubercle bacilli. I had heard of, and seen, Mr. Roberts' experiments with oxygen in the peritoneal cavity, and I thought we might perhaps be able to clear up the diagnosis by injecting oxygen into this child's peritoneal cavity to see if it would afford us any further sign of this tumour which we could feel, easily movable, in the right loin. We injected oxygen, and you see by the skiagram shown that we got a good exhibition. You can see how the liver has been separated from the ribs by the oxygen, and that there is a clear air space between diaphragm and liver; and low down on the right side is a large tumour in the shadow of which is the dense nodule seen in the previous X-ray. On the strength of this skiagram I was sure that it was, as we had supposed originally, a displaced kidney, with a stone in the pelvis. A few days later my colleague, Mr. Addison, operated, and found and removed a kidney calculus, about the size of a marble, lying in the thickened pelvis of the kidney. There was no trace of tuberculous glands, either in or around the kidney, in the mesentery or in the ileo-cæcal angle. After the operation the child continued to pass pus and blood for a few days, and then made a good recovery. She went to a convalescent home, and the latest report states that she is perfectly well.

The series of obsessions are interesting; I was obsessed about the nephritis, my surgical colleague was obsessed with the idea of a tuberculous mesenteric gland, because of the position in which he could feel the tumour, my pathological colleague considered it was tubercle because he believed he had found tubercle bacilli, and we were all obsessed for a time by the occurrence of the uræmic symptoms.

I have since tried using oxygen in one or two other cases, but the difficulty I have experienced is that of knowing when there is enough oxygen in the peritoneal cavity to show the organs properly. In the last case in which I tried it, one of hæmaturia, it was a complete failure, as we did not insert nearly enough oxygen. Apparently very varying quantities are required.

Case of Symmetrical Gangrene (? Raynaud's).

By J. PORTER PARKINSON, M.D.

THIS female child, aged 3 years, is the second illegitimate child of an apparently healthy mother aged 25 years, who stated to a representative of the Society for the Prevention of Cruelty to Children that the infant had always been healthy but had suffered from chilblains at Christmas; these had become swollen and blue in March, and had begun to discharge a thick yellow pus from the toes of both feet. The mother also said that the sores would dry up and

then would appear again when the child wore shoes. The toes began gradually to fall off and were found in the dressings.

Child well nourished but small, weighing on admission 22 lb. Looked fairly healthy but was dirty and verminous. Wassermann reaction negative. Outer three toes of left foot have disappeared leaving round sores now healed. All the toes of right foot missing and foot much swollen and very tender, skin purple in colour, and this colour extended half-way up leg, but has since disappeared, and swelling is much reduced. Heart, lungs, abdominal organs and urine normal.

I hope the members of the Section will give their opinion as to the cause of this condition.

I have read of cases of severe Raynaud's disease in children, in which the disease affected not only the superficial structures, but also bones, and in some of the cases the greater part of a limb was affected and either came away or had to be removed surgically. The mother attributed the condition to the child having micturated constantly down the legs, but there was nothing to support that statement, as the skin was healthy above the part discoloured. The hands have not been affected, but the child has been allowed to go about with bare feet. The condition started about five months ago. I think the child has been badly neglected.

DISCUSSION.

Dr. THURSFIELD said he had not seen symmetrical gangrene in so young a child previously; but the President would recall the condition in an older child at Great Ormond Street Hospital; there had been a similar case at St. Bartholomew's Hospital. Both these patients lost their toes, and both were syphilitic. He believed the condition was generally syphilitic. He asked whether the Wassermann test had been done on this child's mother. In some cases of indubitable syphilis, the Wassermann reaction was consistently negative, and he would not exclude syphilis in this child on the finding of a negative Wassermann. He had seen very few cases of hemoglobinuria in this country which were not syphilitic. He recently saw the section of a finger lost by dry gangrene, and in that section the digital arteries presented a striking picture: marked endarteritis, with practically complete occlusion of both digital arteries in the affected finger. He did not know whether there was evidence of syphilis, or no.

Dr. PORTER PARKINSON (in reply) said he had not had the Wassermann test applied to the mother, as she was not easy to reach. He quite agreed with Dr. Thursfield as to the syphilitic origin of many of these cases. This child's wounds were dressed with flavine, and gradually healed up.

Tumour of the External Ear.

By PHILIP TURNER, M.S.

PATIENT, a girl, aged 14 years, with tumour involving external ear, occipital region of the scalp, and parotid region of left side of face.

History: Patient's mother says that tumour of external ear has been present since birth, but during the last six months or so has increased in size so that it now blocks external auditory meatus rendering child deaf on that side unless she retracts and raises pinna. Extension to occipital region and face during past year. Tumour soft but does not fluctuate; seems to have caused absorption or displacement of cartilage of external ear. Well-marked constriction between swelling of ear and that in occipital region, but tumour is probably continuous from parotid region on left side to occipital region beyond mid-line. Several hard nodules can be felt and there is a tender spot

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about external occipital protuberance probably due to pressure on great occipital nerve. Recently, remarkable growth of hair over swelling in front of ear.

The tumour is probably a *nævo-lipoma* which has undergone secondary changes. Another suggested diagnosis is that it is a *lymphangioma* or "cystic hygroma," but it does not appear to be cystic and varies in consistency in different parts.

Treatment is indicated on account of the recent increase in size and especially the obstruction of the external auditory meatus. The tumour is too extensive to excise as a whole, and it is proposed at first to excise that portion which involves the external ear. The amount of bleeding may possibly be excessive, but any hæmorrhage in this situation can be controlled by pressure. When the nature of the tumour and its vascularity have been ascertained it may be possible, later, to remove other portions.

Case of Cirrhosis of Liver with Splenomegaly.

By FREDERICK LANGMEAD, M.D. (President).

I. W. F., GIRL, aged 9 years.

History: The child ailing for about six months, but worse since end of April, complaining of abdominal pain. Bright red blood passed with every stool during the first fortnight of more severe illness; also oozing from gums, and epistaxis. Occasional vomiting. Jaundice of fair severity appeared.

On admission, May 9, 1921: In addition to jaundice a few telangiectases noticeable on face. Gums continued to ooze slightly. Some dilated veins in flanks. In epigastrium liver can be felt enlarged, hard and nodular. Spleen also enlarged, reaching below costal margin for about two fingers' breadths, varying considerably in size, and not hard. Some ascites developing since admission. Slight enlargement of cervical glands and axillary glands. Nutrition good.

Continuation: Jaundice has lessened, hæmorrhages diminished, but ascites increased. Wassermann reaction negative on two occasions. Urine: Normal, no bile pigment nor salts. During the last week temperature has risen to 100° F. in the evening, and on one occasion to 101° F.

BLOOD COUNTS.

	May 12	May 25
Red blood cells ...	4,700,000	4,400,000
Hæmoglobin ...	74 per cent	66 per cent.
Colour index ...	0.78	0.75
White blood cells ...	5,500	3,000
Polymorphs ...	69 per cent.	58 per cent.
Small lymphocytes ...	22 "	28 "
Large lymphocytes ...	5 "	8 "
Eosinophils ...	2.5 "	2 "
Large hyalines ...	1 "	4 "
Basophils ...	0.5 "	—

Diagnosis appears to lie between Banti's disease and primary hepatic cirrhosis. In favour of the former is the leucopenia, whilst the telangiectases suggest the latter. Neither explains the enlargement of lymphatic glands; this, however, is slight.

Since the anæmia is progressing slowly and the leucocytes are diminishing, opinions are asked as to the advisability of splenectomy.

DISCUSSION.

Dr. THURSFIELD said certain other factors should be considered in such a case. He had never met with Banti's disease in a child of this age, though cases were sometimes recorded in children, under that name. When those cases were critically examined, they were generally found to vary in some particular from the accepted criteria of Banti. The present case seemed to satisfy most of those criteria, still, there were one or two features which should give pause. The first was the size and shape of the spleen. He thought that in any case which could legitimately be called Banti's disease, long before the stage of cirrhosis from ascites was reached, the spleen was larger and more solid than it was in this case. Again, the fact that the spleen varied in size pointed to its being a congestive spleen rather than one with the structural changes seen in splenic anemia. Again, this child was much more anemic than she looked; she would not be picked out as an anemic child in a general round of the wards. Yet the facies of a Banti case was so pronounced that the diagnosis from that symptom was sometimes suggested. He submitted that cirrhosis of the liver occasionally, but rarely, occurred primarily in a child, that it pursued a chronic course, and usually ended, late, in death; and after the autopsy one failed to find a cause for the cirrhosis. Many years ago an epidemic occurred among the deer in Richmond Park, which shed a flood of light on the subject; half the herd died of acute cirrhosis of the liver. He had portions of one of the livers for section. It was a typical multilobular cirrhosis, and the source was believed to be an infective agent communicated from one animal to another. There was also a condition known as Gaucher's family splenomegaly. It was not always "family," however, nor always as innocuous as it had been represented to be; Dr. Paterson, of Great Ormond Street Hospital, had shown him sections which had the typical appearance of Gaucher's disease, taken from a baby in whose family there were no other cases. This child might, therefore, be suffering from that form of hepatomegaly. With regard to treatment, the prognosis was so bad that he thought Dr Langmead would be justified in asking his surgical colleague to explore. He did not expect harm would arise from splenectomy; conversely, no benefit could be expected, because he did not think the disease was primarily in the spleen. Draining of the gall-bladder for a long period might be advantageous.

The PRESIDENT (in reply) said he regarded it as a case of primary cirrhosis of the liver, not Banti's disease. The possibility of its being one of Gaucher's family splenomegaly had not occurred to him. The same argument might be used against the diagnosis of Gaucher's disease as had been used by Dr. Thursfield against that of Banti's disease: the spleen was too soft and variable.

Case of (?) Cerebro-spinal Meningitis.

By FREDERICK LANGMEAD, M.D. (President).

D. H., MALE, aged 13½ years.

History: On February 21, pains in legs, and eruption on skin began; regarded as erythema nodosum. No joint swellings. About a week afterwards severe paroxysmal pains developed in head, beginning in temporal regions, and radiating sometimes to forehead and sometimes to back of neck and occipital region or shoulder; these recurred every few days, and were accompanied by fever (temperature gradually rising with each attack), and sometimes by vomiting. Much cerebral irritability accompanied the attacks, the boy being restless and disliking examination. No head-retraction. Between the attacks he was quite at ease, and had a good appetite.

I saw him first on March 15, with Dr. Carrell, of Ilford, in an interval between the attacks. Physical examination was negative, except that there was some rigidity of the legs, appreciable loss of weight, a slight mitral systolic bruit and slight tenderness over the left kidney, which was unduly

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easily palpable. The knee-jerks were difficult to elicit, but the reflexes otherwise were normal. There had been no albuminuria. In the absence of physical signs (other than those mentioned), the interpretation of the paroxysmal headaches and bouts of fever was difficult, and in view of the recently noticed palpable kidney, bacterial examination of the urine was advised. The urine was subsequently reported upon as containing *Bacillus lactis aërogenes*.

During the subsequent week the boy's condition did not improve under alkaline and urinary antiseptic treatment, the bouts of fever being more severe and prostrating, and the boy continued to lose weight although feeling quite well in the intervals between the attacks.

He was admitted to St. Mary's Hospital on April 10, and the same evening the temperature rose to 105° F., with severe headache as before. Thereafter there were similar attacks every forty-eight hours until April 27, the temperature ranging from 97° F. to 105° F., and the chart resembling closely that of tertian malaria. Examination during attacks always revealed restlessness, general hyperaesthesia, flushing, and rigidity of legs, whilst sometimes there was vomiting, ptosis, and double external squint. Urine normal, and now found sterile upon bacteriological examination. Radiographic examination of abdomen negative. Cerebro-spinal fluid was under increased pressure and contained 6,500 white blood cells per cubic millimetre, chiefly polymorphonuclears. Culturally it was negative on two occasions, nor were any organisms seen in a film after centrifugalization. Blood culture and examination for malarial organisms negative. There was a leucocytosis of 23,000, 90 per cent. of which were polymorphs. Ophthalmoscopic examination and otoscopic examination both negative. An agglutination test against strain *a* of meningococcus, the cerebro-spinal fluid being used, showed no trace of agglutination. Complement-fixation test of blood serum for tubercle negative. Quinine failed to stop the fever.

After April 27 the febrile attacks became more occasional, one occurring on May 3 and another on May 7. On April 27, during and after the attack, patient complained of numbness in the left forearm and left leg, and partial anaesthesia was present in these positions. It gradually disappeared within a few days.

On May 8 a final lumbar puncture was done, the fluid escaping under great pressure. Since that date there have been no further rises of temperature, and the boy is now convalescent. The knee-jerks are still difficult to elicit, and there is nystagmus.

In view of the gradually increasing intrathecal pressure, the high polymorphonuclear count in the cerebro-spinal fluid, and the negative findings by other examinations, the case is regarded as probably one of cerebro-spinal meningitis with Box's crises, in spite of the absence of physical signs between the crises (except for diminished knee-jerks), and the negative results of repeated bacteriological examination of the cerebro-spinal fluid.

Dr. COCKAYNE considered the President's diagnosis was correct. During the influenza epidemic of 1918, a young man came with several others, all complaining of slight headache and some pain in the back. On the next day he developed a rash on the arms and legs resembling that of erythema nodosum. No abnormal physical signs were found. The knee-jerks and plantar responses were normal, there was no head-retraction. After four or five days the temperature came down, and he seemed quite well. He was put on to full diet and allowed up. After having been up for two or three days, he felt ill, his temperature rose, and next day he had head-retraction and other signs of meningitis. Lumbar puncture was done, and meningococci were found. He was treated with appropriate serum, but he gradually got worse and died.

Section for the Study of Disease in Children.

President—Dr. FREDERICK LANGMEAD.

DISCUSSION ON THE TREATMENT OF THE RHEUMATIC CHILD.¹

Dr. F. JOHN POYNTON

said that the treatment of the rheumatic child was a subject of peculiar import at the present time of transition and development in which new suggestions were most likely to compel public notice. In a comparatively short space of time the problems of cancer, tuberculosis and venereal diseases had attracted the interest of the medical profession and the public, and the problem of rheumatism in childhood should receive a like attention, the more so because rheumatism was in its nature infective.

The most valuable step that could be taken in the treatment of infective heart disease would be for the profession to centre its attention upon its prevention and arrest in the early stages, and the very attempt would throw light upon a chapter in the history of heart disease as yet but imperfectly written.

Heart disease was only one of the problems in the wider study of rheumatism and of the rheumatic child, but it was a very definite and pressing one, and one with which he hoped this country would deal on broad lines, encouraged by the experiences in New York.

Useful lessons however might be learned from the very fact that rheumatism had not attracted such attention as cancer, tuberculosis and venereal diseases had done, for experience had shown the mistakes likely to be made when handling such problems on a large scale, and these might now be avoided.

Treatment logically included that given during an acute attack; that of a child who had shown evidence of a rheumatic tendency, but had not yet suffered from a definite attack, and that of a child who had won through one or more attacks and had been more or less damaged in the struggle.

He would not himself deal with the treatment of an acute attack, further than to say that, speaking with the greatest caution, he had observed in lingering cases some value in the sensitized vaccine made by Dr. Nabarro from the strains of the strepto-diplococcus isolated from the severe cases they had seen at the Children's Hospital in 1920, sufficient value, that is, to continue observations. They commenced with a small dose of 50 millions and were guided by the presence or absence of reaction. He was not prepared to say more than this, for everyone here knew how difficult it was to appraise the value of remedies in rheumatism and very definite facts were rightly demanded before any new treatment was accepted.

¹ At the Provincial Meeting of the Section, held at Reading, June 24 and 25, 1921.

The treatment of the rheumatic child who had never had an acute attack or who had recovered from such an attack introduced points of much interest. Some of these he would now put forward and those which he omitted other speakers would doubtless supply.

The medical profession should as far as possible agree as to the part taken by predisposing causes in modifying and influencing the course of the actual infection in rheumatism. It would be admitted that the actual cause was the infective agent, but it should be remembered that attendant circumstances might greatly alter the results of the infection.

(1) Inheritance, particularly double inheritance, tended to increase the gravity of the outlook; and the importance of this factor had, he believed, been thoroughly established although the actual figures had differed in the various published statistics. The latest hospital statistics by Dr. Paterson, Dr. Spence and himself gave the percentage at 40. Statistics showed that a female child with a rheumatic tendency was more liable than a male child to develop the disease; the proportion was about three females to two males. The fact however which appeared to him striking was the greater fatality of acute attacks in the male than in the female. The figures had shown the fatality in the 1920 outbreak to be 18 per cent. in males and 10 per cent. in females. These figures were based on 172 cases of acute rheumatism actually under observation. It was the first attack that appeared to be particularly fatal to the male, for of twelve fatal first attacks in the series of 172 cases ten had been in boys. The maximum incidence of first attacks was around the seventh year.

(2) Attacks in children under 5 years were usually grave and the outlook for the future was always serious.

(3) He approached the difficult questions of soil and climatic surroundings with particular interest, for the town of Reading being situated on the banks of the Thames, they would have an opportunity of hearing first hand, medical views upon the incidence and type of rheumatism met with in the children in the locality. His opinion was that low-lying damp localities tended to make the rheumatism more stubborn; to make the arthritis approach the rheumatoid type, and to delay recovery from all lesions. Did they greatly increase the incidence? The answer to the question had important bearing on the treatment of the rheumatic child on a large scale. What were the views upon the nature of the soil and the incidence of rheumatism and how much value was to be attached to the popular idea that a chalky soil favoured the disease? In London, rheumatism in childhood was frequent and in London clay was predominant. His own impression however was that rheumatism was frequent after a spell of hot, dry, dusty weather, followed by a sudden burst of cold winds and rain. England was not a good climate for the rheumatic, and for that reason it was of particular importance that they should agree upon the most favourable localities as regarded soil and surroundings in which to place these children.

(4) The changeable seasons of the year were those during which the rheumatic was most likely to break down. The further and detailed study of the seasonal incidence would serve a useful purpose in view of anticipating attacks in susceptible children.

(5) Insanitary and badly built houses favoured the disease, and many would have met with examples of children who when in hospital had made excellent recoveries from acute attacks and had left in good health, only to break down again very rapidly on going home. In such a house two or three

of the family might be rheumatic, and what was more convincing, none of them might have shown signs of the disease until he had lived in that house. It would be very helpful to obtain more information upon these points. All the circumstances of poverty no doubt favoured the incidence of rheumatism and were a danger to the rheumatic child.

(6) Another point was the effect of rheumatism on the nervous system. Dr. Cheadle and the clinicians of his generation made it plain that the rheumatic child was unstable, easily fatigued and lacking in reserve power, and to-day they might regard it as proven, that the vast majority of the chorea in the country was of rheumatic origin. In large towns chorea was so frequent that it was a duty to discover whether there was any predisposing cause at work.

With regard to the school age and its dangers, it seemed to him probable that there was a lack of elasticity in educational methods, which threw an undue strain on the unstable rheumatic child, lowering the nervous vitality and allowing the rheumatic infection to act with readiness on the brain. Clearly however there were other factors to be considered in school life, such for example as the spread of throat affections, insufficient clothing, particularly foot-wear, and scanty food.

Leaving now the predisposing causes for those bearing on treatment, he would touch upon a very practical and difficult problem in rheumatic heart disease—the question of rest. They knew that rest alone would not prevent acute rheumatic attacks. One convincing case under his observation had been that of a child kept in a Phelps' box for two years, under the mistaken diagnosis of cervical caries. During that time he had had two severe attacks of rheumatic carditis.

Rest was essential in acute rheumatic heart disease, but here there were two great difficulties: (1) The decision, in some cases, that a heart was affected by organic disease; and (2) the degree of rest and length of time rest should be persisted in, when the active disease had quieted down. These were points worthy of close discussion. If the problem of rheumatism and its concomitant heart disease became a national question, it was clear that public money should not be wasted in putting children with healthy hearts into homes for cardiac disease or in converting such homes into simple rest homes.

No doubt many children had systolic murmurs which were of no clinical importance, and irregular hearts which were not diseased, but there was one difficult group of rheumatic cases in which the neuro-muscular structures had been damaged, but the valves were not injured, and in which a condition resembling the notorious D.A.H. resulted. Such cases required careful and prolonged supervision.

With regard to rest—in his opinion it could be overdone: exercise when carefully graded and supervised was a valuable heart tonic for the young. His ideal home for cardiac cases in children was one fitted with all the necessities for the steady and progressive training of damaged and weakened hearts—equipped for massage, and medical exercises, having grounds with level paths and paths of various gradients, and adapted for open-air rest.

He believed that the difficulty of deciding when to stop complete rest was over-rated. If they bore in mind a cautious forward policy—and kept a watch on the temperature, pulse, cardiac outline and general condition, they could not go far wrong; even if they were a little hasty in any particular case, they could stop the advance before real harm was done. The danger lay in

fixed limits and abrupt changes. A patient dying from the results of acute carditis after a temporary rally of two months' duration, and who had never advanced from the stage of rest, had shown at the autopsy a pericardium only just becoming adherent and the muscles still very soft. The whole time of illness had been four months—and therefore it was evident that a severe carditis required more than four months for its healing, and that after a severe carditis six months' complete rest was not too long. Such a condition was however very different from that of a mild mitral endocarditis, with little evidence of myocardial damage. Rest too long persisted in was harmful to the child physically and mentally, but he would venture to emphasize that the forward policy must be gradual and supervised.

No children benefited more from a few days of enforced rest than did the rheumatic—whether they were only unsatisfactory, from the overstrain of their unstable nervous system, or whether they had a compensated heart lesion and had exceeded the wise limits of their reserve.

The education of many children with definite heart disease would, he imagined, be far better carried out in connexion with special homes for cardiac cases. At present they were often in this position: A child had definite damage to the heart; they were not satisfied with the conditions under which it was drifting on at home, and yet were not confident that it could undertake school life. It would be interesting to hear how far the special schools for invalid children were considered suitable for cardiac cases. Probably each of them had formed his own views upon that point.

The education of parents, teachers and matrons upon the chief features of acute rheumatism in childhood would be of great assistance in the treatment of the rheumatic child, and would in time help to enlighten the general public, who were still widely ignorant of the dangers to which the rheumatic child was exposed.

Some competent organization should as soon as possible take in hand the question of suitable employments in after-life for children who had rheumatic damage to their hearts. The American Association for the Prevention and Relief of Heart Disease had taken great pains over this obvious and necessary step in the treatment of heart affections.

The channels of entrance of the infective agent constituted another point for consideration. He included in these the tonsils, the naso-pharynx, and the nasal cavities, and he considered that there was a rheumatic otitis media. He was not personally impressed by the suggestion of infection from the teeth and gums, or from the intestinal tract, though he believed that rheumatism attacked the abdominal organs. He believed that more than twenty years ago Dr. Paine and he were the first to prove the origin of acute rheumatism from tonsillar infection, and later with Mr. Waugh they had worked at the problem of chronic tonsillar infection and had strongly supported the operation of enucleation. To-day he was in danger of being carried off his feet by the very policy they had assisted in framing. These operations required judgment—they did not protect entirely against further attacks, and knowledge of the paths of entrance of the infection and of its behaviour in the tissues, when once it had got a foothold, was still imperfect. Apart from operative measures was sufficient care taken in local treatment of the throat and nose in rheumatic attacks?

From the point of view of diagnosis, a most disturbing feature was the fact that virulent rheumatism might be apyrexial—for, though when such

cases came to hospital their gravity was usually apparent, how those who had to face the earliest phase could possibly grasp the situation passed his comprehension.

The difficulties surrounding the treatment of the rheumatic child were indeed exceptional, and one of the most puzzling questions was that of fever. A mysterious fever was not infrequent, and he defied anyone to explain some of these cases in the present condition of knowledge. They had in any particular case their suspicions—of the heart or of the throat—but they might be driven to abandon precautions in despair, and then see the fever go and be left none the wiser.

They were on fairly safe ground if nodules appeared, for then there was reliable evidence of danger, whether a case were pyrexial or apyrexial. This was clearly illustrated in the series he had already quoted. In thirty-three cases there had been nodules, and of these twelve had died and at least fifteen had become complete invalids.

Arthritis and muscular pains were now generally recognized as danger signals, and it was useful to remember that the most painful joints might not be swollen. Anæmia in a rheumatic child, and even more particularly in the adolescent, should always meet with attention; he associated its continuance with a liability to malignant forms of endocarditis. The liability of these children to acetonæmic attacks was, in his experience, considerable, whatever the actual pathology of such attacks might be, and epistaxis might be the signal of an attack of active rheumatism.

In conclusion, he would summarize some of the points for discussion which he had noted:

- (1) The importance of predisposing factors—especially those of climate, soil and surroundings in determining the character of a rheumatic attack.
- (2) The influence of educational strain, if any, on the rheumatic.
- (3) The value and limitation of rest in the treatment of rheumatic heart disease.
- (4) The paths of infection and the correct treatment of the initial lesions.

Dr. C. F. COOMBS (Bristol)

said that he had made some investigations in Bristol into the influence of soil, climate, &c., in the incidence of rheumatic heart disease. This inquiry had been based on an examination of death certificates for the years 1876-1913, a basis which was not very accurate, so that any deductions arrived at must be regarded as tentative rather than final. He had found that a low rainfall was followed by a high incidence of fatal rheumatic heart disease, and a high rainfall by a low rate of the same disease. He had not been able to prove that soil and relation to rivers were concerned in the causation of the disease, though he had a suspicion that in this respect the figures he had collected were misleading; and Dr. Langmead's inquiry into rheumatism among London school children supported the view that this disease was particularly rife on the banks of water courses. He had been impressed while in London with the severity of rheumatic heart disease contracted in the Thames valley.

The fact had emerged from his investigation that thoroughly urban areas were more subject to the disease than were relatively rural areas. This point he regarded as of great importance, and he said that he was considering plans for testing its validity on a wider scale. As to a "portal of entry" of infection, he was satisfied that there was no particular relation between dental caries

and cardiac rheumatism. He had been rather disappointed with the results of operations on the nasopharynx, which did not seem to hinder the occurrence of fresh outbursts of activity. He thought that for a limited group of cases of rheumatic heart disease, institutions which would provide for education concurrently with treatment would be of value, and suggested that these cases could very well be treated alongside of children with surgical tuberculosis.

In conclusion, he claimed that the problem was one of national importance, stating in support of this that (1) the mortality from rheumatic heart disease in Bristol during 1876-1913 had fallen less steeply than the general death-rate; (2) figures furnished by Dr. R. A. Askins, School Medical Officer, Bristol, showed an actual increase of organic heart disease in 1920 as compared with 1912; (3) the data of the Ministry of National Service showed how large a part organic heart disease played in the causation of unfitness for military service. An inquiry on a large, even on a national scale, should be undertaken so as to lay the foundation of a plan for the prevention of rheumatic infection.

Dr. GORDON LAMBERT (Reading),

in reply to Dr. Poynton's inquiries as to local conditions, said that there was no doubt that rheumatism and chorea were extremely prevalent in Reading. Experience of hospital out-patient practice enabled him to add that osteoarthritic cases were also strikingly frequent among the medical out-patients.

With regard to the portal of infection, a considerable proportion of the rheumatic patients showed enlarged, unhealthy tonsils; on the question of carious teeth as a channel of infection, he was not convinced. They were all well acquainted with Dr. William Hunter's valuable work on "oral sepsis" as a cause of certain severe forms of anæmia; but during recent years there had been a tendency to exaggerate the causal importance of oral sepsis, almost every known disease having been ascribed to it at one time or another.

Dr. C. J. MACALISTER (Liverpool)

agreed that it was extremely important that something should be done on national lines to prevent the incidence of heart disease among children. Nearly a fifth of the deaths in the country were due to heart disease, and whereas the heart affections were not in themselves fatal during childhood, yet they sowed the seeds which ended in the harvest of death and disability later on.

With regard to the importance of dealing with the conditions causing heart disease, Dr. Macalister said that at the hospital at Heswall they took in cases of minor rheumatism as well as of the more severe type, and of chorea, growing pains, and other conditions recognized as likely to give rise to heart disease. By doing this they saved a good many hearts and indeed, in the early conditions of endocarditis and myocarditis it seemed likely that the progress of the affections was stayed, so that organic changes were minimized.

He referred to the importance of treating rheumatism, both in the acute varieties and in those sub-acute and apyrexial varieties which were so dangerous intensively, by the administration of large doses of salicylate at frequent intervals, his belief being that this drug practically constituted a chemical test

for rheumatism, which rapidly subsided under its influence when administered in an intensive way.

In Liverpool they had endeavoured to get the cases placed under treatment at an early period by making use of the Invalid Children's Association as a clearing house. In this way they certainly secured a great many cases at an early period of the disease. The school medical officers, for instance, discovered them and sent them to the Invalid Children's Association or to the Royal Southern Hospital, where they were seen and transferred to Heswall.

The PRESIDENT

said that the treatment of the rheumatic child, theoretically, fell into three divisions: the preventive treatment, the treatment during the course of active rheumatic manifestations, and the after-treatment. Practically it was very difficult to draw a dividing line between the three stages. No one would deny that prevention was all-important, but at present actually very little was known with certainty of the measures necessary for, or capable of, safe-guarding a child of rheumatic inheritance from acquiring the disease. The earliest results of the infection often had so little diagnostic value that a permanent valvular lesion might easily develop before any other manifestation had arisen which could be definitely called rheumatic. Such early manifestations were tonsillitis, epistaxis, epigastric pain, or muscular pains. A large proportion of the cases of mitral valve disease found during routine examination of children, had been entirely unsuspected, and a history of rheumatism might be unobtainable or only elicited on searching questioning.

Systematic attention to tonsils and adenoids in children of rheumatic parentage he agreed was of considerable importance as a preventive measure. There could be little doubt that they provided the commonest portal of entry for the infection. He had been impressed by the frequency of unhealthy tonsils in rheumatic children, and had found that they required removal on ordinary grounds four times as often in rheumatic children as in others. The uncertain advantage of removal of tonsils and adenoids in children who had developed rheumatism, a point to which Dr. Poynton and Dr. Coombs had referred, was, he thought, only to be expected. At that stage the operation was too late to prevent further attacks, for it was very probable that recurring rheumatism was not renewed infection but a new lighting up of infection already incurred.

It was equally difficult to say when the active disease was over and when after-treatment, properly so-called, began. There was little question that this rheumatic infection often smouldered on, gradually producing crippling cardiac disease, without fever or acute manifestations. When a definite attack of acute rheumatism had died down, leaving a badly compensated valvular lesion, the schools for physically defective children were certainly a valuable safeguard; but he agreed with those who had spoken of the advantages of residential institutions in the country where such children could be kept under close observation and at the same time educated along suitable lines. It was interesting to hear of the satisfactory experiences which attended this plan at Liverpool.

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CLINICAL SECTION AND SECTIONS OF MEDICINE AND SURGERY.

(JOINT MEETING.)

February 11, 1921.

DISCUSSION ON THE MEDICAL AND SURGICAL TREATMENT OF GRAVES' DISEASE.

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March 11, 1921.

ADJOURNED DISCUSSION ON THE MEDICAL AND SURGICAL TREATMENT OF GRAVES' DISEASE.

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The Society does not hold itself in any way responsible for the statements made or the views put forward in the various papers.

Clinical Section.

President—Sir ANTHONY BOWLBY, K.C.B., K.C.M.G., K.C.V.O.

Case of Splenomegaly, with Great Enlargement of Liver, and with Jaundice (Acholuric), but no Ascites.¹

By WILLIAM SALISBURY SHARPE, M.D.

PATIENT, a male, aged 58, a clerk, admitted complaining of shortness of breath, weakness, and yellowness of skin.

History of present illness: For the past ten years he has noticed that his eyes are tinged yellow. Up to two years ago he was in good health, then he began to notice shortness of breath. Until February, 1920, he carried on his occupation as a clerk, but then had to cease working owing to shortness of breath and weakness; about this time colour became deeper. During the past eighteen months he has got thinner. He was never very fat, and has not been confined to bed, but is unable to walk much. Bowels regular, stools well coloured (normal colour).

No previous illnesses except the diseases of childhood, and influenza a year ago. Alcohol: Patient has been accustomed to bitter beer in moderation, but not spirits.

Family history: Father and mother both died at advanced ages, both over 70; causes unknown. Two brothers, one alive, one died from "dropsy."

Examination: Patient is thin. Definitely jaundiced, the sclerotics yellow. Venous arborization on face. Distinctly cyanosed. Respiration frequent, 32 per minute in bed. Tongue slightly coated, teeth in fair condition. The abdomen is slightly distended, and the skin of a yellow colour; the abdominal wall thin.

¹ At a meeting of the Section, held October 8, 1920.

The spleen forms a palpable tumour on the left side, continuing up under costal margin, and extending downwards to two fingers' breadth below the umbilicus and to within 1 in. of the middle line; no notch can be felt. It is dull on percussion, firm and solid, and moves with respiration.

The liver is enlarged downwards to four fingers' breadth below costal margin. Its lower edge is visibly outlined, and is seen to move on respiration.

On examination of the lungs there is dullness over second left rib. Dry cavernous breathing from left clavicle to third left rib, less marked over corresponding area of back.

The heart is normal in size and position, and regular in action. A faint systolic murmur is sometimes audible in the aortic region.

Blood: Red blood cells, 3,200,000 per cubic millimetre; hæmoglobin, 80 per cent. (Haldane); colour index, 1.3 approximately; leucocytes, 9,100 per cubic millimetre; polymorphonuclears, 61 per cent.; small lymphocytes, 30 per cent.; large lymphocytes, 5 per cent.; large hyaline mononuclears, 4 per cent. Many mast cells present. Many of the polymorphs present pyriform buds from the nucleus, as described by Grüner. Two specimens of the blood were submitted to the fragility test, but no satisfactory result was obtained. The Wassermann reaction in 1919 was negative, and again in October, 1920. The blood serum contained bile pigments.

Urine: Specific gravity, 1026; highly coloured; acid; no albumin; no blood; no sugar; calcium oxalate and uric acid deposits; no bile by Gmelin's test; no bile by Ohm's test; trace of urobilin.

The knee-jerks were present, but below normal. There is no pruritus. X-ray examination revealed nothing further.

The differential diagnosis appears to lie between: (1) Banti's disease, (2) splenomegaly with acholuric jaundice, (3) splenomegaly with pylethrombosis, (4) syphilis, (5) Hanot's cirrhosis, and (6) hæmochromatosis, the main features of which, as well as those of the patient's case, are tabulated on the following page.

It will be seen that this case does not accurately coincide with any of the group named, but on the whole the evidence is in favour of acquired splenomegaly with acholuric jaundice. The marked cyanosis, for which I am unable to account, is a special feature in my case.

This case is exhibited because the whole of the group of diseases, which includes Banti's and Hanot's syndromes, splenomegaly with acholuric jaundice and other splenomegalies and anæmias, seems to be

either an ill-defined group or a group subject to great variations, and every case of the kind recorded should add to our knowledge.

Suggestions as to treatment, medical or surgical, are needed. I can hardly regard splenectomy as justifiable in this case.

Gaston Lemaire, in a recent paper,¹ suggests tubercle as a possible cause of splenomegaly, and from the case he quotes (in which tubercle was excluded as well as kala-azar, malaria and syphilis) two monkeys were inoculated with spleen blood. One suffered from fever, dyspnoea, cyanosis, emaciation and a tendency to hæmorrhage, the other became emaciated and had enlarged liver. No bacterium nor protozoon could be found. He adds: "Have we here some unknown or imperceptible protozoon?"

	My patient	Banti's disease	Spleno- megaly with acholuric jaundice	Spleno- megaly with pylethrom- bosis	Syphilis	Hanot's cirrhosis	Hæmochro- matosis
Spleen ...	+	+	+	+	+	+	+
Liver ...	+	+ or - slight	0	+	+	+	?
Jaundice ...	Marked	Slight	Slight	Present	Slight	?	Apparent, may be severe
Ascites ...	None	A constant feature	None	Present	Present	Present	Present
Hæmorrhages	None	A constant feature	None	May or may not be	Present	Present	Present
Red cells ...	About 3,000,000 but normal otherwise	—	Fragile, may be —	—	—	—	—
Colour index	+	—	Usually — but may be +	?	?	—	—
Leucocytes	Normal number	—	?	?	?	—	—
Wassermann	—	—	—	—	+	—	—
Urine ...	Slightly tinted, but does not answer to bile tests	Bile	No bile	Bile	Bile	?	No bile

¹ Gaston Lemaire, "Contribution à l'étude des splénomégaties primitives; infection expérimentale," *Bull. et mém. Soc. méd. des Hôp. de Par.*, 1919, xxxv, p. 599 (Rev. in *Trop. Dis. Bull.*, 1920, xvi, p. 218).

DISCUSSION.

Dr. F. PARKES WEBER: The cutaneous telangiectases and the general cachectic appearance of the patient suggest that there is actual cirrhosis of the liver. According to the old classification, the case would have been termed one of "hypertrophic cirrhosis of the liver with chronic jaundice and splenomegaly." On the other hand at that time the cases of "chronic hæmolytic jaundice with splenomegaly" had not been differentiated. Moreover, the complete absence of any xanthomatous change in the skin in the present case is a striking feature.

Dr. SALISBURY SHARPE (in reply): If, as is suggested, there is actual cirrhosis of the liver as a primary feature, one would not expect in so advanced a case to find that total absence of ascites which is one of the unusual features of this particular case.

Postscript.—The following report has been received from Dr. Kay-Mouat, of Bristol, respecting the patient's blood: "Both samples of blood arrived in good condition for testing, and gave the following results: Concentration at which no hæmolysis occurred with either sample was 0.58 per cent. sodium chloride; concentration at which hæmolysis commenced, 0.52 per cent.; concentration at which hæmolysis was complete, 0.41 per cent. These are the figures taken after an interval of five minutes, all results being compared with the normal corpuscles under the microscope."

Ambulatory Case of Lethargic (Epidemic) Encephalitis followed by Symptomatic Paralysis Agitans.

By F. PARKES WEBER, M.D.

THE patient is a young man (H. L. W.), aged 23, born in London of Polish Hebrew parents. He enjoyed good health till December, 1919. On December 20 he was demobilized after serving two and three quarter years in the Army (labour corps), and at that time he was suffering from a bad "cold" (? influenza). About a week after leaving the Army he fell into a lethargic condition, and used to doze off when sitting in a chair, sometimes even during meals. This somnolent condition lasted about five weeks and then gradually passed off, so that the patient considered himself practically well again, but complained of a feeling of fatigue on walking. He had not been laid up; the whole

illness had been a so-called "ambulatory" one (using the term in the French sense, as in *ambulatory* typhoid fever, or "typhus ambulans"). He remained fairly well till June, 1920, when he suffered from diarrhoea for two weeks. After that the lassitude increased and he commenced to be troubled with trembling or shaking in the hands and legs; he was also often unable to micturate when he wished to. During the early part of September he was an in-patient at the London Hospital, under Dr. Robert Hutchison, who regarded the case as a form of lethargic encephalitis. The Wassermann reaction was found to be negative.

After leaving the London Hospital (September 13) he felt worse and complained of increased stiffness in his jaw-muscles. He was admitted to the German Hospital under my care on September 18. The patient was well built, and I could find no signs of disease, excepting a striking nervous condition, resembling paralysis agitans, without much tremor. The tremor, such as it was, was best marked in the left hand, and, though it was not really of the intention type, it was nevertheless increased by movements of the limbs. It was chiefly in regard to his immobile "mask-like" face (the "Parkinsonian mask" of French authors), his general muscular stiffness, his attitude, gait and monotonous speech, that he resembled a true case of paralysis agitans, such as one meets with in older patients. He could use his hands and fingers, but was very awkward and took a long while in buttoning up his waistcoat and similar movements.

In the hospital he has occasionally complained of a dull pain in the hypogastric region. There are and have been apparently no local paralyses or loss of sensation, or any mental symptoms. The case is certainly not one of stuporous or catatonic insanity. The knee-jerks are excessive and tend to be of the "trepidation" type. The ophthalmoscopic appearances are normal. The urine is free from albumin and sugar. There has been no fever since admission; the pulse is mostly about 64 and the respiration about 20 per minute. He has been given urotropin ($7\frac{1}{2}$ gr., three times daily) and a little faradic electricity to the left hand. His general condition appears to be on the whole slightly improving, but (possibly from psychical causes) varies considerably from time to time; the tremor has diminished.

An excellent example of "ambulatory" lethargic encephalitis in a child, aged 12, was described by H. Janet at the Société de Pédiatrie, Paris, on January 20, 1920, and a few other ambulatory cases have been reported, but the present case is the only one I know of in which an ambulatory form of the disease has been followed by the well-known

Parkinsonian syndrome. In regard to this condition of symptomatic paralysis agitans the case may be compared to those shown by Dr. S. A. Kinnier Wilson.¹ In such chronic forms of lethargic encephalitis the prognosis is uncertain, and there is a danger of relapses and of the disease wearing out the patient (*cf.* Constantin Economo, in regard to "subchronic lethargic encephalitis").² Besides the various chronic forms of lethargic encephalitis, it seems that in some cases the pathogenic microbes (whatever they may be) are not completely destroyed when the patient apparently recovers. The disease may thus become quite latent or quiescent, though it is in reality slumbering on and may wake up again in an acute or subacute form, occasionally with fatal result. Thus C. Trétiakoff and Bremer at the Société de Neurologie (Paris, July 1, 1920) described a case of a woman with lethargic encephalitis and symptomatic paralysis agitans, in whom a late relapse (after she had been considered out of danger) proved fatal. The necropsy (microscopical examination) showed, amongst other changes, decided degeneration of the cells of the locus niger—a lesion which the authors regarded as explaining the presence of the syndrome or symptom-complex of paralysis agitans in that case.

Hydronephrosis due to Abnormal Renal Vessels kinking the Ureter.

By R. P. ROWLANDS, M.S.

THE patient, a married woman, aged 49.

History: For eighteen years she has suffered from violent pain and swelling in the left loin. Seventeen years ago had two operations: (a) tapping, (b) nephrorrhaphy. Relief followed for ten years. Since then she has had increasing attacks of pain and swelling in left flank. An X-ray examination was negative for stone. Urine: Oxalate crystals, a few pus cells, slight albuminuria; *Bacillus coli* on cultivation. The amount of urea in the blood three times the normal.

Diagnosis: Obstruction of ureter by abnormal vessel, or valve formation at the upper end of the ureter.

At the operation the ureter was found to be constricted by an abnormal artery and vein passing behind it and kinking it at its

¹ *Proc. Roy. Soc. Med.*, 1920, xiii (Clin. Sect.), p. 65.

² *Wien. Arch. f. inn. Med.*, 1920, i.

junction with the pelvis. These vessels were divided, but a constriction remained and a valve was present at the junction of the ureter and the pelvis. The opening was enlarged after Finney's method. The abnormal vessels as usual were derived from the renal vessels.

Dr. Newton Pitt, in 1894,¹ drew attention to this condition. Sir Henry Morris, in 1905,² published the report of a case; nephropexy had failed four years earlier. I myself have operated on about twelve cases.

Either a vein or artery or both, passing towards the lower lobe of the kidney, may hook the ureter and cause hydronephrosis. Almost invariably the abnormal vessels are derived from the main renal vessels. Mostly, but not invariably, they pass behind the ureter. They cause renal colic and intermittent hydronephrosis with little change in the urine. Renal calculi sometimes form in the dilated pelvis. Cystoscopy and pyelography may establish the diagnosis.

Timely division of the offending vessels usually cures, but in some cases uretero-pelvic anastomosis is necessary to relieve secondary stricture or valvulation. In late cases nephrectomy may become necessary.

The condition is little known and often overlooked, even at operation, nephropexy, nephrolithotomy or even nephrectomy having been often done.

Partial Gastrectomy for Simple Ulcer.

By R. P. ROWLANDS, M.S.

MRS. A. C., aged 51, patient of Dr. Hurst and myself.

History: Since 1913 had frequent attacks of vomiting. Two bad attacks about Christmas, 1919. X-ray report: Stomach (vertical) pear-shaped. Small projection half-way along lesser curvature with marked tenderness. Greater curvature lies at brim of pelvis. Peristalsis active towards pylorus (horizontal position). Duodenal cap easily filled, not tender. Stomach emptied in four hours. Complete achylia gastrica.

Diagnosis: Carcinoma of the stomach.

At the operation, a large hard ulcer was found 2 in. from the cardiac orifice. This was thought to be malignant; therefore three-quarters of the stomach were removed and an anastomosis made after the anterior

¹ *Trans. Path. Soc.*, 1894.

² *Lancet*, xi, p. 158.

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Polya-Mayo method (that is, direct union of the jejunum, 12 in. down, to the cut end of the stomach, in front of transverse colon).

Microscopic section revealed no carcinoma.

The patient has done well, putting on over a stone in weight.

This patient had had double nephropexy performed elsewhere without relief. Ultimately gastric ulcer was diagnosed and confirmed by radiography, which displayed the crater of an ulcer on the lesser curvature. Complete achylia pointed to malignancy. At the operation the ulcer was so hard that this suspicion was strengthened and the greater part of the stomach was therefore removed.

The patient has done very well, but she had some partial obstruction of the colon at first from pressure of the mesentery of the jejunum on the colon. This was due to the use of too short a loop, which should be at least 12 in. long when the anterior Polya-Mayo method is employed.

When medical treatment of gastric ulcer has failed, it is a debated question—what is the best surgical treatment? Partial gastrectomy is too dangerous for frequent use, its mortality, in the best hands, being at least five times that of gastro-jejunostomy. It should be reserved for selected cases and be performed by expert surgeons only. Gastro-jejunostomy is very satisfactory for pyloric and prepyloric ulcers, but it is not so certain to relieve the symptoms of ulcers in other parts of the stomach, especially those in the lesser curvature high up, adherent to or invading the liver or pancreas. Local excision of the ulcer is a formidable, risky operation, and often fails to cure and has to be followed by partial gastrectomy or gastro-jejunostomy. Gastro-jejunostomy, with cauterization of the ulcer (Balfour's operation) or invagination of the ulcer, offers the best alternative to partial gastrectomy in these difficult cases. Partial gastrectomy in skilful hands appears to be the most certain cure, and it may remove an early unsuspected cancer, or prevent its subsequent development in a chronic ulcer.

Hour-glass Stomach with Pyloric Stenosis, treated by Gastro-jejunostomy, followed by Gastro-gastrostomy.

By R. P. ROWLANDS, M.S.

Miss E. M.; patient of Dr. Hurst and myself. Operation at Guy's Hospital, December, 1919. The patient had suffered from symptoms of gastric ulcer for many years. Radiography showed hour-glass contraction.

There was an hour-glass contraction with the pouches about equal in size. The contraction was not very narrow and the ulcer was slung up by a band of adhesions to the anterior abdominal wall. There was also pyloric obstruction due to a contracted duodenal ulcer. There were no gall-stones. I first performed gastro-jejunostomy and then gastro-gastrostomy. The two operations lasted fifty minutes.

The patient has put on much weight and has been very well ever since.

Gastro-gastrostomy appears to be the most satisfactory operation for the relief of hour-glass contraction of the stomach. It carries a very small risk, and restores almost perfect function. It is not always enough, for when pyloric stenosis is present as well, either the gastro-gastrostomy must be supplemented by Finney's operation of gastro-duodenostomy or by gastro-jejunostomy, preferably the former. Gastro-plasty is more difficult, invades the strictured ulcerated area and does not give such immediate relief, for the food has to pass over the ulcerated area. Sleeve resection of ulcerated stricture has not proved satisfactory, for contraction, obstruction and pain have often followed it. It is bound to be far more dangerous than gastro-gastrostomy. Gastro-jejunostomy alone serves best when the lower pouch is very small, and when the pylorus and duodenum are not obstructed. Partial gastrectomy, as for carcinoma, should be performed, if possible, when cancer is suspected. Retrograde dilatation of the stricture has been the only method possible in some cases, owing to extensive and dense adhesions around a high stricture near the cardiac orifice.

I have operated on over twenty cases of hour-glass contraction with only one death, and that was due to accidental suffocation.

Carcinoma of Stomach : Partial Gastrectomy.

By R. P. ROWLANDS, M.S.

G. D., male, aged 54. The patient's weight used to be 216 lb. ; it is now 154 lb. He has symptoms suggestive of duodenal ulcer but has rapidly got worse and has lately been vomiting large quantities—pailfuls—and often he has brought up food taken two days previously. The X-ray examination showed an enormously dilated stomach with twenty-four hours' delay in the exit of opaque meals. Mr.

D—CL 1a

Redding suggested pyloric obstruction, probably not malignant. Gastric analysis was also in favour of simple ulcer.

Operation (May 20, 1920): There was a large growth occupying the greater part of the pyloric segment, the secondary glands in the lesser omentum and on the celiac axis. No secondary growth elsewhere. Therefore I removed about two-thirds of the stomach and made an anastomosis after the anterior Polya-Mayo method. The operation lasted about one hour and a quarter. The patient stood it well. There was some difficulty in separating the growth from the pancreas so some of the latter had to be removed.

Patient has since gained $1\frac{1}{2}$ st. in weight, and has been at full work as a labourer for five weeks.

Clinical Section.

President—Sir ANTHONY BOWLBY, K.C.B., K.C.M.G., K.C.V.O.

The Clinical Significance of Shoulder-pain in Lesions of the Upper Abdomen.¹

By ZACHARY COPE, F.R.C.S.

By shoulder-pain I mean pain felt in the region of distribution of the descending cutaneous nerves which take their origin from the third and fourth cervical nerves. This includes, roughly, an area bounded by the spine of the scapula, acromion process, clavicle and base of the neck. These boundaries are, however, overlapped anteriorly and laterally, for the subclavicular fossa and upper part of the deltoid region are supplied by the descending clavicular and acromial branches respectively. The area supplied by the fourth cervical is the most important to note. It is assumed in all the cases described that there is no disease of the shoulder-joint. Pain felt in the area mentioned in the course of disease of the upper abdomen is due to irritation of the diaphragm or its peritoneal covering and is reflected in the fibres of the phrenic nerve.

The frequency of pain felt at the tip or on top of the right shoulder in cases of liver-abscess often made me wonder whether this pain was due to irritation of the liver itself or to irritation of the adjacent diaphragm. The diaphragm seemed the more likely site of origin, for the shoulder-pain was most acute in those cases in which an abscess threatened to burst into the thorax. For example, one man used to swing his right arm in order to gain relief from the pain in the shoulder until one day he coughed up pus and the pain disappeared. Later, a study of the pathological data furnished in the excellent monograph of

¹ At a meeting of the Section, held November 12, 1920.

E. J. Waring, made it clear that shoulder-pain in liver-abscess was seldom or never felt, unless the pus was near to, or threatening to perforate the diaphragm. The conclusion seems reasonable that shoulder-pain in amoebic abscess of the liver, and probably in other hepatic conditions, is due to irritation of the terminal fibres of the phrenic nerve in the diaphragm itself, not to irritation of the liver. The origin of the phrenic nerve—namely, from the fourth cervical nerve—would, of course, easily explain the reflected pain.

Another question which puzzled me was why in liver-abscess pain was sometimes felt in the supraspinous fossa and at other times in the clavicular region. The following cases bear on this point:—

In August, 1920, a man, aged 59, was admitted to St. Mary's Hospital in great pain and with symptoms pointing to perforation of a gastric or duodenal ulcer. When he lay down in bed he felt severe pain in the *right supraspinous fossa*. The pain persisted till he was operated on. At the operation I found a perforation of an ulcer about the junction of the first and second portions of the duodenum with a considerable amount of plastic lymph in the subhepatic region. I sewed up the perforation and performed gastro-jejunostomy. The man lost his shoulder-pain immediately after the operation and made an uninterrupted recovery. Wrongly or rightly I attributed the pain to irritation of the posterior part of the right side of the diaphragm.

Six days afterwards at St. James's Infirmary, Wandsworth, I operated on a man, aged about 30, for symptoms pointing to a perforated ulcer. In view of the last case I inquired about shoulder-pain, and learned that since the onset of symptoms a few hours before, he had five or six times, on coughing, experienced a severe stabbing pain in the right shoulder. The pain was felt in the right supraspinous fossa and less severely in the right supraclavicular region. Operation showed a perforation of a pyloric ulcer. The signs of inflammation were also here most distinct in the subhepatic region. The ulcer was sutured and gastro-enterostomy performed, an uneventful recovery taking place. Operation entirely relieved the shoulder-pain which, again, seemed due to irritation of the right side of the diaphragm posteriorly.

A week later I was called to a patient with acute pain in the right side of the abdomen, suggesting an intra-abdominal lesion. The illness began one morning when the patient awoke at 6 o'clock with acute stabbing pain in the right subclavicular fossa. On examination nothing abnormal was found in the abdomen, but below the right clavicle was a very hyperalgesic area, and on auscultation of the chest a soft, sticky and

evidently pleural crepitation could be heard at the lowest level of the right pleura *in front*. No adventitious sound and no dullness could be found posteriorly. The temperature was 103° F. A diagnosis of diaphragmatic pleurisy was confirmed by the after-course of the disease. Slight basal pneumonia developed but a good recovery ensued. The strict localization of the pain to the right anterior shoulder-region and the limitation of the ascertainable signs to the right anterior diaphragmatic region caused me to think that there might be a correspondence in the localization of the pain in the shoulder and the lesion affecting the diaphragm.

At this time a patient on whom I had operated a year previously for a large left-sided empyema reported herself and incidentally mentioned that she had a nasty pain sometimes at the back of the left shoulder. She indicated the pain to be in the left supraspinous fossa. I had opened the empyema by an incision and resection of rib at the base of the pleural cavity posteriorly. The tube had been placed just above the posterior part of the diaphragm and the posterior shoulder-pain was explicable by the healed sinus-scar dragging on the posterior part of the diaphragm.

About this time a young woman was admitted to the Bolingbroke Hospital with a history that five hours previously she had awakened with terrible pain in her abdomen and severe pain in both shoulders. When I saw her soon after admission she presented the signs and symptoms of a perforated gastric ulcer. I inquired about shoulder-pain, and she at once said that she had pain in the shoulder almost as severe as that in the abdomen. Asked to localize the shoulder-pain she pointed to the site of the acromio-clavicular joint on each side. When I gently touched the position indicated she cried out with pain. Bilateral pain indicated a median irritation of the diaphragm and since the pain was bilateral from the start I thought the perforation would be near the cardia opposite the central part of the midriff. Therefore, contrary to my usual custom, I opened to the left of the middle line and discovered a perforation on the lesser curve well up towards the cardia. This was fairly easily sutured and for some days the patient progressed well. The shoulder-pain had entirely disappeared when I asked her about it six hours after the operation. A week later a little fever began, and I suspected subphrenic abscess. On the tenth day there was dullness at the left base posteriorly. When questioned, she stated that for the last five days she had had pain in the left shoulder, indicating the left acromio-clavicular joint. Concluding that pus was irritating the left

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side of the diaphragm I operated with the intent of opening the abscess. Finding, after incision and resection of a portion of the left tenth rib, that the pleura came down almost to the costal margin, I made a subcostal incision rather more to the front, and passing my finger up lateral to and in front of the splenic flexure of the colon, opened a large stinking left anterior subphrenic abscess. A large drainage tube was inserted. What I consider the most instructive part of the case is that after the abscess was opened the acromial pain disappeared but the patient complained of pain all along the left clavicle, suggesting that when the irritation was removed from the left dome of the diaphragm, and the anterior portion of the muscle was irritated by the tube and pus, the pain was transferred to the clavicular region. This patient is now well though she had a sharp attack of left-sided pneumonia a fortnight after the subphrenic abscess was opened.

Soon afterwards, a patient came under my care suffering from thoracic actinomycosis chiefly affecting the left costo-diaphragmatic region. An abscess from which the fungus was obtained had been opened anteriorly. A painful swelling developed over the lower posterior left costal region, and the patient also complained of pain in the left supraspinous fossa. He attributed this pain to rheumatism, but there was no other sign of rheumatism, and the pain in the supraspinous fossa became better directly and in proportion as did that in the lower costal swelling.

I have lately met with another very instructive case. A youth was admitted to the Bolingbroke Hospital with symptoms of general peritonitis. He was very ill, and the resident surgeon who operated thought it wise merely to drain the pelvis. The general condition improved and the fever abated. In ten days' time the lad complained of the occasional occurrence of a pain exactly over and along the left clavicle. The medical officer (Major Lowe) examined the left lung base, discovered signs of pleurisy, and asked me to see the patient. Examination showed dullness, diminished breath and vocal sounds at the left base posteriorly. The presence of fluid, however, did not account for pain over the clavicle. On listening to the front of the left chest I found the cause of the clavicular pain in the presence of pleuritic respiratory crepitations. The history of the case combined with the irregular fever and clavicular pain pointed to the presence of a subphrenic abscess towards the anterior aspect of the left side of the diaphragm. I resected the anterior part of the tenth left rib, and subpleurally opened a subphrenic abscess just in front of the spleen.

By the kindness of Mr. Clayton-Greene I am able to quote two cases which occurred in his practice. The first was a case of appendicitis which occurred in a distinguished physician. Fifteen hours after the onset of abdominal pain acute pain was felt over the right acromial region. The pain was greater on inspiration and felt as if a nail were being driven into the bone. At operation a perforated retrocaecal appendix was found, and there was a great amount of sero-purulent fluid in the abdominal cavity. Probably the purulent fluid irritated the right under-surface of the diaphragm. For three weeks after the operation slight pain was felt in the shoulder on deep inspiration.

I obtained the particulars of the second case from Dr. Davson, the physician in charge. The patient was a woman, who suffered from gall-stones. Mr. Clayton-Greene performed cholecystectomy, and put a rubber tube down to the stump of the cystic duct. After the operation the patient complained of very severe pain in the right supraspinous fossa. Dr. Davson released the stitches fastening the tube to the skin and withdrew the tube very slightly—about an eighth of an inch. The pain immediately ceased. By consultation with anatomists I have carefully attempted to ascertain exactly where the undue pressure would have been made by a tube in that position, and the conclusion is that the tube was pressing against the peritoneum over the vena cava and right crus at the posterior boundary of the foramen of Winslow. Here again then the stimulation of the terminals of the posterior branch of the phrenic caused pain in the posterior part of the shoulder region.

Recently my colleague, Mr. Lake, told me that he had a patient under his care suffering from acute pancreatitis, who had pain over the posterior part of the left shoulder, and of a case of chronic posterior gastric ulcer adherent to the pancreas, in which there was a similar pain. These might well be accounted for by irritation of the left crus of the diaphragm. Mr. Lake has also operated successfully on a case of perforated gastric ulcer with bilateral shoulder-pain.

From a consideration of these cases I wish to suggest :—

- (1) That the cause of pain in the shoulder in abdominal lesions is irritation of the diaphragm, not of the abdominal viscera.
- (2) That unilateral irritation of the diaphragm causes pain over the corresponding shoulder.
- (3) Acute bilateral shoulder-pain indicates a median irritation of the diaphragm and commonly results from a perforated gastric ulcer.
- (4) There is a correspondence in the distribution of the descending cutaneous branches of the third and fourth cervical nerves and that of

the phrenic nerve on the same side. The pain caused by irritation of the front of the diaphragm is referred to the clavicular or sub-clavicular region, of the dome to the acromio-clavicular or acromial region, and of the posterior portion and crus to the supraspinous fossa.

(5) Pain on the top of the shoulder is likely to be of diagnostic value in subphrenic abscess, diaphragmatic pleurisy, actinomycosis of the chest, liver abscess, and possibly some cases of acute pancreatitis.

In this short note I have purposely omitted the discussion of shoulder-pain caused by biliary colic. I would remark, however, that pain on the top of the shoulder is rather rare in gall-stone disease, and I believe it can always be explained by some direct irritation of the diaphragm.

Chronic Myeloid Leukæmia: Death from Acute Anæmia due to Massive Hæmorrhages (Hæmatomata); Simulation of Slight Pyuria by Leukæmic Oozing in the Urine.

By F. PARKES WEBER, M.D.

THE patient, W. P., aged 48, a Polish Jewish hat-maker, was admitted to hospital on April 19, 1920, with signs of chronic myeloid (spleno-medullary) leukæmia. He had formerly enjoyed good health, but during the last eight months there had been a swelling of his abdomen. For the last three days he had been troubled with frequency of micturition. The spleen was enlarged and hard, reaching downwards to just below the umbilical level, and to the right as far as the umbilicus. The liver was enlarged, extending four finger-breadths below the costal margin in the right nipple line, and there was slight enlargement of the lymphatic glands in the left axilla, in both groins, and at both elbows (supracondylar glands). The blood-count, on March 30, had given: Hæmoglobin, 100 per cent.; erythrocytes, 4,100,000 per cubic millimetre; white cells, 473,600 per cubic millimetre. The examination of a stained blood-film showed the typical picture of chronic myeloid leukæmia; myelocytes, myeloblasts and polymorphonuclear leucocytes seemed to occupy as much of the field as the erythrocytes. On April 20 the erythrocyte count was only 2,850,000 and the white cell count had risen to 1,040,000. The blood-serum gave a negative Wassermann reaction. The brachial systolic blood-pressure was 130 mm. Hg. Ophthalmoscopic examination (Dr. R. Gruber, April 26,

1920): "Numerous, mostly small, retinal hæmorrhages, chiefly of venous type; also a few small irregular exudative clumps. The process is more marked in the right eye than in the left."

The urine on admission yielded a sediment of what at first sight was thought to be pus, but which in reality was due to leukæmic oozing into the urine. On April 20 the urine was of specific gravity 1015, cloudy in appearance, strongly acid to litmus paper, containing a little albumin, free from sugar; the centrifuge-sediment showed erythrocytes and various white blood-cells but no tube-casts.

On April 21 the patient complained of pain in the right side of the thorax, which was thought to be pleuritic in origin. Some dry cups were applied by the house physician, and on the following day there was a large fluctuating swelling on that side, which greatly increased in size by April 23. It was evidently a tense deeply-seated hæmatoma, and was accompanied by a gradually increasing ecchymotic purple discoloration of the skin. This discoloration was not chiefly over the central portion of the hæmatomatous swelling, but at the borders and adjacent parts; downwards it reached as far as the right trochanter major, and upwards to both sides of the back of the neck; on one side it extended along the vertebral column and on the other side it extended down the antero-lateral portion of the thorax and trunk. This massive hæmatoma was followed by slight rise of temperature (to about 99.8° to 100.2° F. in the afternoons) and by a distinct icteric tinge of the sclerotics—doubtless connected with absorption. The urine, though high-coloured, never gave a distinct Gmelin's reaction. About May 8 another extensive deep hæmatoma occurred in the left upper arm. Afterwards both the hæmatomata gradually became less, and both practically disappeared by July 8. The urine on June 14 was free from albumin and sugar.

The patient had left the hospital on June 25, in relatively good condition. In the hospital he had received arsenical treatment (Fowler's solution) and a little Röntgen ray treatment. He was also given calcium lactate against the hæmorrhagic tendency. The blood-counts were as follows.—

Date	Hæmoglobin per cent.	Red cells in the cubic millimetre of blood	White cells in the cubic millimetre of blood
March 30	100	4,100,000	473,600
April 20	—	2,850,000	1,040,000
May 1	—	2,750,000	362,000
May 13	42	2,880,000	260,000
June 3	88	4,200,000	140,000
June 17	97	6,200,000	80,000
June 25	100	5,340,000	160,000

It is clear that in this case the loss of blood in the hæmatomata (and the reabsorption from the hæmatomata) was followed by a hæmopoietic (erythroblastic) reaction, which was accompanied by a diminution in the excess of white blood-cells.

On the patient's readmission to hospital on September 15 the erythrocyte count was 4,800,000 ; white cells, 64,000 ; hæmoglobin, 79 per cent. ; the microscopical examination still showed the typical picture of chronic myeloid leukæmia. The brachial systolic blood-pressure was 160 mm. Hg. The urine was of specific gravity 1008, acid, free from albumin and sugar. About that time another hæmatoma occurred in the soft parts of the inner side of the left thigh. A few days afterwards the abdomen was found to be distended, apparently by hæmorrhage ; there was ecchymotic discoloration of the skin of the inner upper part of the left thigh and of both sides of the scrotum. In connexion with the effusion of blood there was slight pyrexia on September 19 to 22 (up to $99\cdot2^{\circ}$ to $100\cdot2^{\circ}$ F.). On September 27 there was another large hæmatoma on the left side of the chest. The distension of the abdomen was thought to be due to retroperitoneal hæmorrhage. The patient was pale, very restless, tossing about in bed, with a very weak pulse, and evidently suffering from acute anæmia in connexion with the effusion of blood. He complained of pain in the abdomen, and the abdominal hæmorrhage may have been favoured by the application of hot-water bottles, which had been given to relieve the pain. The sclerotics were yellowish. The urine was scanty and high-coloured and gave a thick precipitate of albumin. A subcutaneous injection of coagulose was given, but he died in the early afternoon of September 27. During the last week the urine had been twice observed to be red with blood.

An incomplete *post-mortem examination* showed diffuse enlargement of the liver and spleen, especially the latter. The kidneys were large and pale, and in the pelvis of the right one was a brown hard calculus (about 12 mm. by 10 mm. by 5 mm.), giving the murexide test for uric acid. There was an enormous extraperitoneal (retroperitoneal) hæmorrhage (coagulated blood) occupying a large part of the left side of the abdomen and a large part of the pelvis—perhaps continuous with the hæmatoma of the left thigh (which was not examined at the necropsy). In the peritoneum there was some blood-stained serous effusion (which had apparently filtered through from the extraperitoneal hæmorrhage). The most recent hæmorrhage—that on the left side of the thorax—was outside the ribs and below the muscles

connected with the shoulder girdle; the effused blood was not yet coagulated.

REMARKS.

The connexion of uric acid gravel and uric acid calculi with leukæmia (owing to the metabolism connected with excess of nuclein from the nuclei of the white blood-cells) is well known and the occurrence of the calculus in one of the kidneys of the present case was therefore not very remarkable. According to Martin and Denis,¹ the uric acid blood content appears to be increased by Röntgen-ray treatment in myeloid leukæmia. The nephrolithiasis doubtless accounted for the temporary frequency of micturition complained of in April, 1920, and it probably likewise explained the occasional slight hæmaturia. That leukæmic oozing in the urine may at first suggest slight pyuria is not astonishing. When we examine sections of kidneys showing extreme diffuse leukæmic permeation we can easily understand that the white cells may occasionally burst into the urinary tubules, so as to produce a leakage of white cells rather than erythrocytes into the urine.

In leukæmic cases the not uncommon occurrence of large hæmorrhages in various situations, including massive hæmatomata in the soft parts, is generally recognized, though death is not usually due to the grave acute anæmia which may result. A case somewhat similar to the present one was described by E. Barié and Salmon in 1903.² The patient was a man, aged 35, with myeloid leukæmia and great enlargement of the spleen. There were subcutaneous ecchymoses. A painless fluctuating swelling appeared below the angle of the right scapula. On the second day it was bigger than a fist, and on the third day it was of the size of an infant's head. This massive hæmatoma was opened to check further hæmorrhage. The exact source of the hæmorrhage could not be found, but compression was applied. Nevertheless, the bleeding rapidly recommenced and the swelling became larger than before. The patient died in coma. Achard and Feuillée³ recorded a case of extremely hæmorrhagic leukæmia in a man, aged 66. It was an acute case. He suddenly began to suffer from hæmorrhagic symptoms in the gums, buccal mucous membrane and nose, petechiæ, subcutaneous hæmatomata, and hæmaturia, with pyrexia, prostration and

¹ *Amer. Journ. Med. Sci.*, Philad., August, 1920.

² *Bull. et Mém. de la Soc. méd. des Hôpitaux de Paris*, 1903, sec. 3, vol. xx, p. 193; also abstract in *Med. Rev.*, London, 1903, vi, p. 298.

³ French Medical Congress, Paris, October 1907, *Presse médicale*, Paris, 1907, xv, p. 672.

diarrhoea. Death supervened on the ninth day. Dr. H. Schmidt told me of a post-mortem examination he made on a leukæmic female infant, aged $5\frac{1}{2}$ months, with lymphomatous nodules in various viscera, who died from diffuse meningeal hæmorrhage (between the dura mater and the pia mater).

Dr. Gordon Ward has kindly drawn my attention to an interesting paper by J. B. Herrick, of Chicago,¹ on "Multiple Cerebral Hæmorrhages in Leukæmia." The case was that of a man, aged 23. According to Herrick "it is generally recognized that hæmorrhage is a common event in myeloid leukæmia, and cerebral hæmorrhage is not rarely the cause of death in that disease." Gowers, in his article on "Splenic Leucocythæmia,"² wrote: "Cerebral hæmorrhage is an occasional and very grave complication. It occurred in eight cases and in each was the cause of death. The gravity arises from the fact that it depends on the local effect of a general cause, and the condition produced is widely spread through the brain, and the hæmorrhage is therefore generally extensive and often multiple." It should be noted that just as cerebral hæmorrhages in leukæmia may be multiple, so the massive hæmatomata in the trunk and limbs of my present case were multiple.

Dr. Gordon Ward has drawn my attention to the case of a man with acute leukæmia recorded by Dr. D. Chalmers Watson in 1911.³ Death took place suddenly from what appeared to be a ruptured abdominal aneurysm. The necropsy revealed that the abdominal cavity was full of blood which had come from one of the large red hæmorrhagic tumours in the spleen and liver.

Hæmatemesis may be the cause of death in chronic myeloid leukæmia. Thus, on July 23, 1908, a woman (Mrs. L. A.), aged 66, was admitted to hospital under my care, after having had severe hæmatemesis on the previous day. She was pale and feeble, with great enlargement of the spleen, which reached downwards to the anterior superior iliac spine. The edge of the liver was four finger-breadths below the costal margin in the right nipple-line. There was practically no enlargement of the superficial lymphatic glands. The spleen had been more or less enlarged for two years. In the hospital, on the day of admission, the patient again vomited blood. The next morning, July 24, at 3 a.m., there was another copious hæmatemesis, and death

¹ *Festschr. f. Prof. Hans Chiari* (Wien, 1908, pp. 317-326).

² Reynolds's "System of Medicine," Lond., 1879, v, p. 265.

³ *Edin. Med. Chir. Soc.*, June 7, 1911; report in the *Lancet*, Lond., 1911, i, p. 1703.

followed at 6 a.m. The post-mortem examination showed the case to be one of chronic myeloid leukæmia. The spleen weighed 112 oz. and the liver 120 oz. The microscopical examination of the liver showed typical leukæmic permeation. A miliary white nodule in the left kidney was microscopically a leukæmic growth. The splenic structure was that of myeloid leukæmia. Some white-coloured bone-marrow from the middle of the shaft of the right femur consisted apparently almost entirely of myelocytes. Professor A. E. Boycott, who made a (post-mortem) microscopic examination of the blood, found it "myelæmic," about 50 per cent. of the white cells being typical myelocytes. The stomach contained a good deal of blood, but I could find no distinct ulcer; nor did I notice any varicose veins at the cardiac end of the œsophagus. In this connexion it may be noted that W. J. Mayo¹ writes: "Toxic erosion of the gastric mucosa is the usual cause of the gastric hæmorrhages which accompany cirrhosis of the liver, splenic anæmia, and certain disordered blood states."

The nature of a swelling due to a deep-seated massive hæmatoma in the soft parts in a case of myeloid leukæmia may not always be recognized immediately, but in a day or two some of the effused blood or hæmoglobin will usually have filtered through to the surface, giving rise to widespread ecchymotic discoloration of the skin, and the nature of the deep-seated swelling thus becomes clear. In regard to large extra-peritoneal hæmorrhages distending the abdomen, the question of an exploratory operation may even arise, especially if the leukæmic changes in the circulating blood (blood-count, &c.) are not as pronounced as they are in ordinary typical cases.

Case of Diffuse Hypertrophy of the Breasts.

By LAWRIE MCGAVIN, F.R.C.S.

M. S., AGED 25, married five months; now three and half months pregnant. Following an injury to the left breast a fibro-adenoma was removed two years ago. Since that time this breast has always been slightly larger than the right. During the second month of pregnancy both breasts began to enlarge very rapidly, accompanied by diffuse inflammation, the whole surface being hot and red and the glands tender to pressure. They are now dusky in colour, long and pendulous,

¹ *Annals of Surg.*, Lond., 1911, liv, p. 313.

reaching nearly to the waist, very heavy and marked by striæ. Their substance is nodular and the nipples are almost obliterated; the mammary veins are large and well defined. Patient's personal medical history is good. Her mother had three children, none of whom she could suckle owing to retracted nipples; this resulted in mammary abscess on one occasion. Patient's maternal grandmother suffered from myxœdema.

Case of Injury to Right Elbow.

By G. DE BEC TURTLE, M.D.

G. B., A FEMALE, aged 31. Whilst on a holiday fell off a bicycle on to her right arm. Consulted a doctor the same day, who advised rest; no further treatment. Ten days later returned to town at the expiration of her annual leave and came to see me. There was distinct limitation of both flexion, and, more especially, extension of the elbow-joint. An X-ray photograph was taken on September 6 showing a fracture and some displacement of the internal condyle of the humerus. She has been undergoing massage and passive movements since, and the joint has decidedly improved. Flexion is now practically complete, but extension decidedly limited, and the question of operative treatment arises. The limitation of movement of the joint does not interfere with her capacity for her work as a counter clerk.

The Disappearance of a Mediastinal Neoplasm under X-ray and Radium Treatment.

By R. T. LEWIS, L.R.C.P., M.R.C.S.

(Introduced by Dr. BATTY SHAW.)

H. C., A MALE, aged 34, had noticed a lump forming below the inner end of the left collar-bone in front of the chest, twenty months ago in Mesopotamia. Shortness of breath developed as well as pain in the left arm eighteen months ago, and he was invalided home to England. Fourteen months ago while he was in the Tooting Military Hospital an enlarged gland was found in the left side of the neck. It was removed and revealed the microscopical appearance of an alveolar

sarcoma. He had three short exposures to X-rays resulting in the complete disappearance of the lump in front of the chest and diminution in size of other cervical glands. He was admitted to the Middlesex Hospital in November, 1919, under the care of Dr. W. Essex Wynter, and the remaining glands in the neck disappeared under exposure to radium; they reappeared in February in this year, but again disappeared under the influence of radium. Dr. Essex Wynter states that a very definite growth was seen in the chest by means of a skiagram. The patient then left the hospital and for four months resumed his work as an architect's draughtsman, but the glands reappeared in July of this year, and there was considerable œdema of the front of the left chest, and of the left upper arm. The patient was under the observation of Dr. S. H. Bates, and was admitted to University College Hospital on August 30, 1920, under Dr. Batty Shaw.

He was then much wasted, distinctly cyanosed and very short of breath; there was a glandular swelling in the left posterior triangle as large as a hen's egg, also in the left axilla; he had a left "sympathetic" eye; his voice was hoarse and weak, and there was complete paralysis of the left vocal cord; there was œdema of the front of the left chest from the clavicle to the costal margin and this extended to the posterior axillary line. The area revealing œdema also showed distended veins. The left chest was dull from the clavicle to the base in front; it was impaired to percussion from the apex to the left scapular spine and absolutely dull below this level. The breath sounds were subtubular over the upper part of the left lung, but below the level of the scapular spine the breath sounds were absent; there was defective movement of the left chest; the impulse of the heart was obscured and the heart dullness reached the right edge of the sternum. Screen examination showed almost complete opacity of the left chest and this was visible in the X-ray plate. The blood count merely showed secondary anæmia; the Wassermann test was negative. He was subjected to X-ray exposure on September 14 and 24, and considerable diminution in size was noticed in the cervical and axillary glands as a result.

By courtesy of Captain A. E. Hayward Pinch the patient was then exposed to the influence of radium on five occasions. Captain Pinch's observations confirm in all details the clinical report. By screening he found complete loss of translucency of the whole of the left lung except for a small area under the middle of the left clavicle. The position of the heart appeared to be as above indicated.

It gradually became evident that the left chest was losing its extreme

dullness to percussion and that the œdema of the chest wall and arm was considerably less, and at the present moment, though the note is impaired, the left lung is much more resonant than it was, the only trace of dullness being present at the left base. Fluid was suspected at this spot and an aspiration-needle was inserted. All the fluid that could be removed amounted to 27 c.c. X-ray plates of the chest taken shortly after reveal the fact that the upper part of the left chest has become very much clearer, but that there is still opacity of the extreme base of the chest. So far as the mediastinal shadow is concerned, there can be seen an increase of the ordinary shadow of the mediastinum to the right, the edge being sharp; increase of the shadow of the mediastinum to the left is visible, but presents a woolly as opposed to a sharp edge. The patient's general condition has greatly improved, and he has now completely recovered from a severe attack of left-sided herpes zoster which developed during October.

The case is shown because on clinical grounds there was reason to believe that just as the cervical glands had disappeared on three separate occasions previously under the influence of X-rays and radium, so now on this fourth occasion one had disappeared as well as the axillary glands under similar treatment. It is assumed that the dullness of the left chest was due, in part or wholly, to infiltration of the lung by the malignant growth, and that this infiltration not only involved the sympathetic and left recurrent laryngeal nerves, but also caused venous and lymphatic obstruction over the upper left chest and arm and caused enlargement of the veins of the chest wall. The disappearance of the dullness of the left chest under X-rays and radium harmonizes with the view that the infiltration of the lung by malignant growth had been overcome; hence the relief from some of the above signs and symptoms.

An obvious objection to this view must be raised because it is conceivable that the dullness to percussion of the left chest and the X-ray appearances were entirely due to a large pleural effusion, and that the resorption of this pleural effusion led to the improvement of signs and symptoms, the pleural effusion, the dropsy of the chest wall and the enlarged veins being all due to thrombosis of the left innominate vein and its branches, and that the recovery from this thrombosis and not the disappearance of the malignant growth, is the cause of the present happy result. In answer to this it may be said that the heart has never been dislocated as much as it would have been, had the left chest been full of fluid from the top to the bottom; that it is not a feature of blockage of the large veins of the neck occurring in mediastinal

neoplasm to pass off, either spontaneously or as the result of X-ray and radium treatment; and that in such blockage of the veins with resulting œdema and pleural effusion the obstruction is generally due to direct invasion of the vessels by the neoplasm and is terminal. It seems therefore probable that X-rays and radium have directly checked the growth and even caused retrogression of the mediastinal neoplasm. Comment has been made on the plates now shown, and the question has been raised whether they demonstrate the existence of a mediastinal neoplasm. It is to be regretted that no plate can be shown indicating the condition of the mediastinum before the application of X-rays or radium, but a perusal of the clinical history and a review of the physical signs and symptoms make it probable that the cause of the symptoms and signs could be none other than a neoplasm of the mediastinum, and it may be even that the original growth (as well as its extension to the left lung) has become reduced under the influence of X-rays and radium.

Postscript by Dr. Batty Shaw.—The patient, shortly after being shown at the Clinical Section, returned home. Dr. S. H. Bates reports that in a week or two the glandular enlargements and the original symptoms and signs returned. The patient became rapidly very ill from dyspnoea and died in about three weeks from the date of leaving the hospital.

Case of Carcinoma en Cuirasse, treated by X-rays.

By H. TYRRELL GRAY, F.R.C.S., and REGINALD MORTON, M.D.

L. G., FEMALE. Carcinoma en cuirasse, right side, July, 1917; brawny, hard infiltration of the skin over the whole breast area.

Operation, July 30, 1917: Incision commenced in the neck, finishing in the abdomen. Posterior triangle was completely dissected out, dissection carried under the clavicle into the axilla and complete breast operation performed. Skin widely excised and deficiency filled in by skin flaps and skin grafting. X-ray treatment systematically carried on afterwards.

April, 1919: Developed scirrhus in left breast. This was removed by a colleague. Two or three months later she came to see me with a most extensive carcinomatous infiltration of the skin of the back over the scapula on the side where the original operation was per-

formed, this being the first evidence of recurrence. This infiltration extended over the right scapular region and part of the right axilla, but did not originate in the original incision. It spread rapidly over to the left scapular region within a week or two, until the whole back was a mass of red, hard, brawny indurated growth, in some places localized in nodules, in others forming large plaques. These were again systematically submitted to X-ray treatment, and have not only steadily disappeared, but the patient's condition has steadily improved concomitantly. There are now a few nodules to be felt.

I am showing this case as one not only of extreme interest, but I think as one of the best examples I have seen of the value of systematic X-ray treatment after operation for cancer of the breast. The patient is now alive and in fairly good health, nearly $3\frac{1}{2}$ years after a condition which was formerly supposed not only to be inoperable, but to lead to death in a month or two.

COPY OF LETTER FROM DR. REGINALD MORTON.

This patient first came to me for X-ray treatment on August 17, 1917. Applications were made three times a week at first, later only twice. After twenty-six applications she was given two months' rest, then a further eight applications and again two months' rest. Then followed a course of sixteen applications, then three months' rest; eight applications and six months' interval. This brings us to the spring of 1919, when the other breast was found to be involved and was removed. A long course of forty-six applications now followed, but of course both sides were being done, and generally only one side was done at each sitting. After a month's interval she returned to the department with recurrence, and from this time treatment was confined to the back and shoulder, later on both back and front of the left chest. She has had 143 applications altogether.

With regard to X-ray details, the tube had a hardness of not less than 10 Wehnelt, generally 11, or even more. The first part of the treatment was done with a "gas" tube, carrying from 1 to 1.4 ma.; later on a Coolidge tube was used, worked at a resistance equivalent to 9 in. of air, current 3 ma., time 15 minutes, anticathode-skin distance 12 in. With the gas tube the time was 10 minutes, and filter of 2 mm. of Al was interposed between the tube and the skin. With the Coolidge tube the time was 18 minutes and the filter 3 mm. of Al. In the latter case the amount of intensity of radiation was about

three times that of the gas tube, and was possible by virtue of the high degree of hardness of the rays and the thickness of the filter. While it is possible to produce an X-ray burn through any filter, it develops so gradually with one of 2 mm. or more that the risk of severe dermatitis is reduced to very small dimensions. As soon as a faint blush appears on the treated area it is only necessary to suspend treatment for from ten to fourteen days when it all disappears. My aim is to use a homogeneous beam of hard gamma rays for this work, as I have found such to be more efficient and less dangerous. I hope to have an important communication to make on this subject at an early date.

Case of Strangulation of the Small Intestine by a Band, with Unusual Absence of Symptoms.

By W. H. OGILVIE, M.Ch.

R. H., A MALE, aged 23, felt a vague sense of discomfort and fullness in the abdomen, with a feeling of nausea, beginning on Sunday, October 17, 1920. This feeling of fullness continued for the next three days, accompanied by constipation, so that he only passed a few very small hard stools. On Wednesday, October 20, at 4 p.m., while at work, he was seized with a sudden violent pain in the abdomen to the left of the umbilicus, which "laid him out." He tried to "carry on," but had to give up and go home. From Wednesday afternoon till Saturday the pain continued, though it was much less acute. During this time he passed no fæces nor flatus. He took only fluids, but these he vomited. However he never vomited except when he took the fluids, and the vomit was described as acid and brownish, but nothing like fæcal in appearance or smell. He was admitted into Guy's Hospital at 3 p.m. on Saturday, October 23.

When admitted, his appearance was not what might be expected from the history. Temperature was 100° F., pulse 88 and strong, respirations 20, tongue clean and moist. He looked well and comfortable. The abdomen was slightly full, but moved well on respiration: no distended coils of intestine were to be seen. The abdominal wall was "on guard" rather than resistant, for when his attention was distracted, the hand could be pressed deeply in anywhere. There was slight

tenderness to the left of the umbilicus. On rectal examination masses of scybala could be felt.

A soap and water enema was given, and after this a large formed motion was passed, and the patient stated that he passed flatus. His pain was relieved, and he went to sleep, and woke next morning feeling, he said, "champion." He was kept on fluids, but he never vomited, and his temperature was now normal, pulse 68. On Monday morning, October 25, he was in the same condition, but vomited a dose of oil. An enema following this produced a small motion; pulse was 80, temperature normal. In the middle of the day he still felt well, but his look was not so bright, and the abdomen was now rather more resistant and distended.

Operation : Laparotomy was performed through a left paramedian incision at 3 p.m. On opening the abdomen a little blood-stained fluid escaped, and moderately distended coils of small intestine were seen. A hand was passed in, and at the pelvic brim encountered a band passing downwards from right to left. This snapped while being palpated, and a mass was felt in the pelvis and was brought up into the wound. It consisted of several coils of intestine matted together, and surrounding a segment of the lower end of the ileum 5 in. long, which was gangrenous and of a greenish-yellow colour. Twelve inches of bowel were resected and a lateral anastomosis performed. No drainage was used. Next day the temperature was 102° F. and pulse 140, but after this the patient made an uninterrupted recovery, and is now absolutely well. The wound is not yet quite healed.

Points of interest : The history on admission was a perfectly definite one of acute intestinal obstruction. The signs on admission were an equally definite contradiction of the history. Where the two lines of evidence are in conflict, we may be too ready to trust the first-hand and neglect the second-hand evidence, especially where the personal factor is an unknown one. The passage of a large motion after an enema, accompanied by the relief of pain and the return of temperature and pulse to normal, seemed absolutely to exclude the "acute abdomen." Another point of confusion was that the man was a plumber, and as he had a clean mouth and a good set of teeth, it was considered possible that he might be suffering from lead colic without showing the characteristic blue line on the gums. A loop of small intestine which had been strangulated for five days was an unexpected discovery at the operation.

Case of Enlarged Ischial Bursæ.

By W. H. OGILVIE, M.Ch.

C. B., AGED 49, electroplater. Family history: Seven in family; all the others well; no abnormalities. Personal history: About 1890 he was doing a "knock-about" turn in a pantomime, one feature of which was to turn somersaults, jumping off the floor and landing on his buttocks on a table. However he was only a few months at this, and the swellings did not appear till seventeen or eighteen years later.

Since 1890 he has been an electroplater, a trade which involves standing most of the day. He has been a crack cyclist, and during the years 1890 to 1906 he was constantly riding in attempts to lower the time records. This would sometimes mean five or six weeks on end in the saddle, training and waiting for a favourable wind. He first noticed the swellings twelve years ago, about the time that he abandoned cycling finally. That on the left appeared first, as a small hard lump like a chestnut. This increased during the first year to the size of an orange, and then remained stationary till 1917. The one on the right appeared a year later, but has increased continuously and steadily. In 1917 the right one was considerably larger than the left. During the last three years the left one has grown rapidly, and now the two are equal in size. They do not interfere with defæcation, and but little with sitting.

Present condition: The patient is a robust man in excellent general health. There are symmetrical swellings on the lower and inner parts of both buttocks. These are roughly hemispherical, of $5\frac{1}{2}$ in. in diameter. They are tense, elastic and fluctuate. The left one shows a thinner area over the lower and outer quadrant. Both are translucent. On contracting the glutei both become tense. Round the edges, and especially the upper edge, hard nodular masses are felt in the wall, almost like cartilage. In the left one hard lumps can also be felt in the interior. They contain a pale straw-coloured fluid, which shows no cells nor organisms, and is sterile on culture. Urine: No albumin, nor sugar, nor blood, nor pus. Wassermann strongly positive. X-ray: No abnormality in hip-joints or ischial tuberosities. Heart: Size and sounds normal.

This case is specially interesting in connexion with the causation of

bursal enlargements. According to the researches of O. Langemak,¹ on which Murphy's operation for arthroplasty was largely founded,² the bursæ with very few exceptions appear after birth in the fatty deep fascia. He traces the stages of arterial hyperæmia, fibrous hypertrophy with disappearance of fat, disappearance of nuclei and change of the fibres to a structureless substance, and finally a liquefaction of this structureless "collagen." These changes at first show the lobular arrangement of the fatty tissue in which they develop. He draws from this mode of development several conclusions, most important of which are, first, that a bursa cannot be the primary seat of an inflammatory process as its wall is structureless and contains no blood-vessels, and secondly, that excision alone can effect the cure of an enlarged bursa since, though the fluid may be removed by aspiration, no reparative changes are possible in the avascular wall. None of these bursæ are lined by an endothelial membrane.

That the first stages he describes are not essential to the formation of accessory articular cavities, is shown by the great success of free fascia lata transplants which have largely replaced the pedicled flaps formerly used in arthroplasties.

In this case the source of mechanical irritation ceased fourteen years ago, or shortly before the swellings first appeared. They have increased steadily during twelve years with apparently even less than the usual irritation to which these parts are subjected. I find this hard to explain on the above pathology.

Hysterical Blindness of Four Years' Duration Cured by Psychotherapy.

By A. F. HURST, M.D., and R. T. F. D. ROBERTS, M.B.

C. A., AGED 37, was gassed in December, 1916. He remembers falling against the parapet, but from that time his memory is a blank for several months, as immediately after being gassed he was wounded in the head. When he regained consciousness he found that he was blind. After being in various hospitals he was sent to St. Dunstan's, where he remained from March to June, 1918, when he was discharged

¹ O. Langemak, *Langenbeck's Arch. f. klin. Chir.*, lxx, p. 946.

² J. B. Murphy, *Journ. Amer. Med. Assoc.* May 20, 27; June 3, 1905.

to his home at his own request. He received no further treatment and no hint was given that he might eventually recover his vision. In April and May, 1920, he was in Kingston Infirmary for fits, which appear to have been hysterical in nature. At a board held on July 1, 1920, he was stated to have optic atrophy and to "require nothing beyond ordinary panel treatment." When seen at a neurological treatment clinic on July 31, a note was made on his papers that "it is difficult to know on what grounds he has been sent into the Clinic, unless as a challenge to perform a miracle." On October 6, however, it was recognized at the Lancaster Gate Clinic that the blindness was hysterical, and he was sent to the Neurological Pensioners' Out-patient Clinic at Guy's Hospital for treatment.

We first saw him on Friday, October 22, 1920. He wore dark glasses and kept his eyes closed, but could open them without difficulty. He could barely distinguish light from darkness with his right eye; with his left eye he could just make out large forms, but could not see individual fingers. The right pupil was rather larger than the left; both responded to light. A brisk flinch reflex was present on the left side, but none on the right. Both optic discs were perfectly normal. There was a round opening in the skull near the middle line in the frontal region. He was very depressed and complained of severe headaches, insomnia and frequent nightmares.

As there appeared to be no way in which the wound could have caused bilateral organic blindness without producing optic atrophy or other physical signs of organic injury to the nervous system, the condition was regarded as hysterical. The patient was told that he would be cured the following Sunday, and it was again impressed upon him on Saturday that he was certain to recover his sight. On Sunday, October 24, Dr. Roberts explained to him that in order to see he must not only open his eyes, but he must also use his brains and *look*. With persuasion and encouragement he rapidly regained his sight, and in half an hour he could see quite well, after having been almost totally blind for nearly four years. The flinch reflex returned at the same time. That night he slept well, his headache disappeared, and next day instead of looking a picture of misery he was alert and cheerful. He required some further re-education before he could accommodate normally, but by October 30 he could read the smallest print, vision being $\frac{6}{5}$ with both eyes.

Case of Coxa Valga.

By H. TYRRELL GRAY, F.R.C.S.

E. G., GIRL, aged about 14. Gradual onset of limping for eight months. No previous injury, no tenderness; shortening $\frac{1}{2}$ in. Wasting marked in the thigh; gluteus not very wasted. No marked flattening of the buttock or obliteration of the gluteal fold. Limitation of movement almost complete in all directions, but slight movement can be obtained. X-rays show exaggerated condition of coxa valga in which the epiphysis appears to be displaced upwards in its relationship to the neck, causing approximation of the great trochanter to the femoral head.

Case shown for diagnosis.

Case of Large Right Scrotal Hernia.

By H. TYRRELL GRAY, F.R.C.S.

PATIENT, a very stout man, aged 54, with enormous right scrotal hernia. Originally seen by me about eight months ago for sloughing of the skin at the apex of the scrotum of about 9 in. diameter, leaving a callous open ulcer, due to pressure. Scrotum suspended and kept in bed for eight months, and the ulcer has now completely healed.

The photograph is shown because an attempt to cure this hernia is proposed. I realize the fact that it will probably be impossible to return all the viscera into the abdomen, and should like to know the views of other surgeons as to the possibility of increasing the abdominal cavity (if necessary) by making a paramedian abdominal incision the whole length of the abdomen, opening the anterior rectus sheath and displacing the rectus outwards, and should it not then be possible to replace the contents of the hernia in the abdominal cavity, opening the posterior rectus sheath and peritoneum, completing a radical cure and suturing only the skin of the abdomen.

The question is whether it would not be more tolerable for the patient to have a large ventral hernia which can be supported by

suitable corsets rather than a scrotal hernia which will certainly result in a recurrence of ulceration the moment he gets up again.

I propose to do the whole operation under spinal anaesthesia in order to make reduction more feasible, and am showing the photograph in order to obtain the advice of any who may have had to deal with a hernia of this size.

Case of von Recklinghausen's Disease (Neuro-fibromatosis).

By R. A. KERR, M.B., Ch.B.

C. L. P., AGED 38, married, omnibus-washer. Patient was admitted to St. Mark's Hospital for operation for hæmorrhoids on October 15, 1920, and he was found to be covered by a considerable number of tumours, of which he states he has had "little lumps" all his life; he noticed the first on the back of the terminal phalanx of his left thumb and then they gradually arose all over his body. He has never had any pain from them, except in connexion with one situated to the left of the upper end of the sacrum. If this is pressed, it sends a feeling like needles up into his left shoulder. New tumours come up from time to time and he is able to tell when they are coming by a sensation of itching and smarting. The discoloration of his skin has been present all his life and he does not think it is increasing. There is no history of similar affection in his father and mother, nor his brothers and sisters, nor as regards his grandparents. He has three children, none of whom is affected.

There are multiple tumours of various sizes in the skin, which is thinned over them, distributed mainly on the trunk and face but present also on limbs and scalp. They are absent from the palmar aspect of the hands but there is a small tumour on the sole of each foot at the hollow of the instep. The tumours are soft and translucent in all cases. The pigmentation is distributed on the thorax and abdomen mainly, and on the latter two large patches are very evident. That on the chest is more like large freckles.

As the patient did not wish to have any of the tumours excised, no opportunity was afforded for microscopic examination of a specimen. There has been no rapid growth in any of the tumours, this leading one to suspect the presence of sarcomatous change.

Case of Diaphragmatic Hernia.

By R. P. ROWLANDS, M.S.

T. M., AGED 19. History: About seven or eight months ago patient first began to suffer pain about one hour after meals, sometimes accompanied by vomiting, the pain being considerably relieved when in the recumbent position but only when lying on the left side. Since that date the periods between meals and onset of pain have become lessened and now he experiences pain directly after meals. There is much flatulence. If he finds the pain is not allayed after meals he induces vomiting. No hæmatemesis. Bowels regular. No respiratory distress at any time. No history of injury. About six months ago patient was operated on elsewhere for supposed gastric ulcer. The stomach was found fixed high up in the epigastrium. The condition was not diagnosed, and the abdomen was closed without further interference. Three weeks after the operation the pains returned as before, being felt in the epigastric and umbilical regions.

Condition on admission: Patient very thin and anæmic. Temperature 96.8° F., pulse 60, respiration 20. Abdomen: Definite sinking in of epigastrium; abdomen moves well; no tenderness; no abnormality to palpation. Thorax: Lower ribs unduly prominent on left side in front and limited above by a sulcus running transversely, like a unilateral Harrison's sulcus; patient had noticed this for six months; chest otherwise looks normal. Heart: Apex 1 in. inside nipple line; no dullness to right of sternum; sounds normal. Lungs: Percussion, normal resonance over both sides, except below scapula on left side, where note is tympanitic; air enters all over both sides but voice sounds weak at left base; no borborygmi nor metallic tinkling heard in chest.

X-ray report (Mr. Redding), dated October 1, 1920: First hour—The œsophagus passes down to the level of the lower border of eleventh dorsal vertebra and then turns to the left to join the stomach. The whole of the stomach lies above the diaphragm, the fundus behind and the pylorus antero-internally. The œsophagus enters the fundus at its lowest part. The motility of the stomach is good, and the meal leaves normally, but the duodenum does not appear to follow its normal course; none of the small gut appears to be above the diaphragm. Some of opaque meal given on previous day now seen in splenic

flexure above diaphragm. Fifth hour—Stomach empty; meal in small intestine. Seventh hour—Meal in small intestine, none in cæcum. Thirtieth hour—Meal occupies large gut from cæcum to pelvic colon.

Operation, October 4, 1920: Intratracheal ether; patient lying on right side. An 8-in. incision made over eighth left rib, which was removed subperiosteally, and the chest opened displaying a large serous cavity occupying the lower two-thirds of the left chest. Through the upper thin wall of the cavity the base of the lung could be seen, but it was not in the cavity. There was no distress on opening the cavity. Nearly the whole of the stomach, the splenic flexure of the colon and the spleen were in this cavity. There were some adhesions between the stomach, the great omentum and the wall of the cavity, and especially between the spleen and the colon and the back and left side of the cavity and the edge of the opening in the diaphragm. The stomach was inflamed, rough, red and bruised on the surface near the pylorus from friction against the front and inner edge of the opening. The opening was 4 in. long and 1 in. wide and placed near the back of the diaphragm, extending downwards and outwards to the chest wall from near the oesophageal opening of the diaphragm. Its edges were thick and smooth. The anterior edge was much more definite than the posterior. The opening was clearly congenital and consisted of a slit between the lumbar and costal muscular fibres. After separating the adhesions and tying many of them, the viscera were returned into the abdomen and the opening in the diaphragm closed with many catgut (Lembert) sutures. The parietal opening was then completely closed without a tube.

The patient was somewhat shocked after the operation but revived after saline enemata. Pulse never went above 120. The wound healed well. Patient got up and walked about fourteen days later. He has improved greatly in health since, and has put on flesh. His symptoms have been completely relieved.

X-ray report (after operation) dated October 22, 1920: "There is a large opacity at the base of the left lung which is probably caused by pleural thickening (? blood-clot) in old hernial sac. The opaque fluid passes freely through the oesophagus and into the stomach, which is lying in normal position in the abdomen and shows no abnormality."

A third radiogram (by Mr. Redding) dated November 9, 1920, shows "a very marked diminution of the opacity in the left chest, showing that the lung is expanding quickly. Both plates of the chest were taken

before the patient had his opaque meals—i.e., there is no question of the thoracic opacities being due to bismuth."

Although over 1,000 cases of diaphragmatic hernia have been recorded, most of them have been in infants born dead or dying soon after birth. The hernia may take place either through a congenital defect in the diaphragm, especially on the left side, or through a laceration of the diaphragm—the result of a wound or crush.

Out of 650 cases discussed by Giffin only fifteen were correctly diagnosed during life, and out of fifty-three operations performed, in only six was correct diagnosis made beforehand. Most of them were discovered during laparotomies for relief of gastric or intestinal obstruction; and in many the operation did not reveal the true condition, which was only discovered after death.

It is very difficult to reduce the hernia from the abdomen, and more difficult still to close the aperture in the diaphragm. The thoracic route, adopted by Llobet, Cranwell, Carson, Barton, and myself, is much better, making the operation, reduction and closure easier, and the hope of recovery far greater.

Very few recoveries have followed operation, especially when the abdominal route has been adopted. Without operation the condition is usually fatal, from intestinal or gastric obstruction, often followed by perforation.

Clinical Section.

President—Sir ANTHONY BOWLBY, K.C.B., K.C.M.G., K.C.V.O.

Recurrent Epithelioma of Floor of Mouth treated by Diathermy.¹

By F. J. STEWARD, M.S.

MALE, aged 64. Two years ago operation for epithelioma of floor of mouth, later removal of glands of the neck on both sides. Six months ago recurrence of growth in the mouth appeared.

Admitted to hospital with a large ulcerating mass involving the floor of the mouth and under part of the tongue. The general condition of the patient was very poor, and he was not considered to be fit for an extensive cutting operation.

Treated by diathermy on October 1, 1920. There was remarkably little subsequent disturbance, and pain, which was very severe before the operation, practically disappeared at once. There was no hæmorrhage during healing.

Epithelioma of Soft Palate and Fauces on the Right Side and Cheek on the Left Side treated by Diathermy.

By F. J. STEWARD, M.S.

MALE, aged 59; referred from the throat department by Mr. T. B. Layton, who had previously removed a portion of the growth which had proved on section to be epithelioma. There was a warty superficial growth involving the right half of the soft palate, and extending to the pillars of the fauces. A second growth of similar type and of the size of a sixpenny-piece was situated on the inner side of the left cheek. The glands on the right side of the neck were palpable.

¹ At a meeting of the Section, held December 10, 1920.

The great extent of the growths, the marked involvement of the glands and the poor general condition of the patient precluded a cutting operation.

Treated by diathermy on May 25, 1920; for a few days subsequently there was some oedema of the cheeks and neck, but this soon subsided. General disturbance and pain were slight.

The man's condition was so much improved three months later that he was considered fit for an attempt to deal with the enlarged glands. This was done by Mr. E. C. Hughes.

When last seen on October 20, 1920, the sites of the growths within the mouth were occupied by firm, white scar tissue. There was, however, some doubtful thickening about the upper part of the scar in the neck.

Cases of Injury to the Carpal Bones.

By C. MAX PAGE, D.S.O., F.R.C.S.

THE more general use of X-ray examination in cases of injury has shown that fractures of the carpal bones are less uncommon than was at one time supposed. The commonest injury is fracture of the scaphoid—a fracture which nearly always remains ununited—and the next in frequency is an injury or displacement of the semilunar. Both injuries are much more often seen in men than in women, and generally between the ages of 20 and 40. Our general knowledge of the subject was clearly defined in 1905 by Codman and Chase [1] in a study of eighteen cases comprising both the above mentioned types of injury. In 1908 Delbet [2] communicated a survey of all the published data, and gave the result of experiments as to the mechanism of causation of the injuries; he came to the conclusion that practically all injuries of the proximal row of the carpal bones were primarily dorsal displacements of the os magnum, the various lesions of the scaphoid and semilunar being secondary.

Our present views as to the treatment of these cases has not progressed much since, it being difficult to compare the different methods adopted on account of the relatively small number of cases which can be serially reviewed.

It is generally admitted that a fracture of the scaphoid alone seldom unites and practically never leaves the joint involved entirely free from pain; in a large proportion of the cases there is definite disability, and sometimes a progressive arthritis of the wrist-joint develops.

These results appear to be present whether the wrist is immobilized for two or three weeks after the injury or whether early movement and massage is carried out. The general evidence suggests that the latter method of treatment is most often productive of later pain and disability. Codman, Stimson, and others maintain that good results are obtained by immobilizing the wrist for three or four weeks; if this fails, excision of the ulnar fragment of the bone is advised. For late cases with much disability, excision of a part of the bone or the whole bone and the semilunar is advised. Vallas [3] recommends excision of the whole carpus in these cases. The results of these late excisions are, on the whole, disappointing. I show two cases of this nature to-night.

Case I: Old Fracture of the Scaphoid (Ununited).—J. J. S., infantry, aged 37. History: In the summer of 1915 he was shot in the knee, and hurt the left wrist falling. He was taken prisoner and received no treatment for the latter injury. He was sent to Russia in 1917 with a labour gang, and though he had pain he worked. He was returned to England in November, 1918. In 1919 he found that pain in the left wrist increased after use and made the hand weak. State: In October 1919 the back of the left wrist was swollen and tender on pressure in its radial half. There was slight limitation of movement in all directions. X-ray showed the scaphoid broken into three pieces with osteo-arthritis changes in the neighbouring bones. Operation, November, 1919: Dorsal incision; ulnar fragment of scaphoid removed; wound sutured and wrist fixed in extended position for three weeks. After-treatment: Massage and hot baths to forearm for several months. Result (December, 1920): Wound sound; there is still fullness over radial side of wrist, no local tenderness. Range of movement is little altered. Pain caused by forced extension of wrist. He can use the wrist for heavy work, but says it is still weak and at times painful. X-ray shows absence of that part of the scaphoid which is normally in contact with the radius. Slight general osteo-arthritis change in neighbouring joints.

Case II: Old Fracture of Scaphoid (Ununited).—P. H. M., Machine Gun Corps, aged 35. History: In July, 1917, he fell on to his outstretched hand. He reported sick next day, had a cold compress applied and after a few days continued his military duties. He was in the Machine Gun Corps in France for over a year, during this time the wrist was always inclined to be painful and seemed to him slightly weak but he did not report sick with it and received no treatment till July, 1920, when he applied on account of the increasing pain and definite disability. State: When seen on July 25, 1920, there was an ill-defined swelling on the radial side on the back of the wrist with localized tenderness on pressure in the "snuff-box." Extension of the wrist was limited and caused pain if forcibly effected. X-ray examination showed an ununited fracture through the body of the scaphoid. Operation, August 3,

1920: Under tourniquet dorsal incision; joint opened vertically and the whole scaphoid bone removed. After-treatment: The wrist was kept in a position of dorsi-flexion for three weeks by means of a cock-up splint; use of the fingers was encouraged during this period, and at its termination massage was applied. Result: When seen on December 6, he stated that he no longer had pain in the wrist except in wet weather. There was still some fullness on the radial side of the back of the joint and little or no improvement in the range of movement. There was no local tenderness but a forced attempt at passive extension caused pain.

Case IV: Old Injury of the Semilunar, Osteo-arthritis of Radio-carpal Articulation.—R. R., aged 37. History: He was blown up and buried in April, 1918, the right wrist and right knee being damaged. These injuries were treated by splintage and subsequently by massage. He returned to South Africa in September, 1919, and owing to continued pain and disability in the wrist-joint, he underwent operation in May, 1920, at Durban. No particulars of the operation are available. State: Seen in November, 1920; a 2-in. vertical scar, soundly healed, was present over the dorsal aspect of the right wrist on the ulnar side, there was a somewhat diffuse swelling on either side of the extensor longus pollicis, and tenderness on pressure over this area. There was slight limitation of extension and radial abduction of the wrist. An X-ray showed an irregular appearance of the semilunar with a considerable reduction in its size, some new-formed bone on the dorsal aspect of the joint and an irregular outline of the scaphoid. Operation, November 25: Dorsal incision; the capsule of the joint was opened and an irregular osteophyte attached to it was removed. The remainder of the semilunar and the whole of the scaphoid were then enucleated, the exposed articular surface of the os magnum was noted to show some osteo-arthritic change. The part of the semilunar removed contained the majority of the radial articular surface and the underlying bone: the scaphoid appeared to have been broken across and to have united firmly by bone. Its articular surfaces show arthritic changes. An X-ray taken on December 6 shows absence of the parts the removal of which is detailed above.

Operation has been undertaken four, three, and two years respectively after injury.

Excision carried out soon after the injury gives much better results. Case III is one of this character. I removed the whole scaphoid and the functional result is excellent, and the removal of the whole bone does not appear to lead to much deformity of the wrist.

Case III: Recent Fracture of Scaphoid.—H. B., aged 25. History: In October, 1919, patient fell from her bicycle on to her right hand. The wrist was afterwards swollen and was treated by means of ointment. The patient stated that ever since the accident the wrist had been weak and painful after use. State: Seen on March 20, 1920, there was fullness on the back of the

wrist on both sides of the extensor longus pollicis and tenderness on pressure in this area. There was some limitation in extension and radial abduction of the wrist. X-ray showed an ununited fracture of the body of the scaphoid. Operation, April 1, 1920: Dorsal incision under tourniquet; joint opened; the ulnar half of the scaphoid was found to be loose though attached to the semilunar; it was removed and also its radial part. Wound closed. After-treatment: Wrist fixed in full dorsi-flexion in cock-up splint for ten days. Subsequently, full use of hand and wrist allowed. When seen on December 1 patient stated that she had full use of the wrist and that it was of normal strength; that she had a little pain after heavy use. The hand showed slight radial deviation, range of movements in all directions were practically normal.

The semilunar is more often dislocated forward and then is often rotated on itself; frequently the dislocation is associated with a fracture of the scaphoid, the ulnar fragment of that bone remaining attached to the semilunar.

That reduction of the displacement is essential in these cases is generally agreed. Reduction by manipulation was reported as successful in nine out of twenty-four cases collected by Delbet. If manipulation fails, open operation is carried out; and, failing reduction, the bone is excised.

Case V is one of dislocation of the semilunar with a fracture of the scaphoid; reduction of the displacement was effected at an open operation, and in view of the youth of the patient may be expected to give a good result.

Case V: Recent Dislocation of Semilunar with Fracture of Scaphoid and Styloid Process of Radius.—F. S., male, aged 16. History: Fell some 10 ft. on to left hand on October 18, 1920. State: Wrist swollen, with considerable fullness in front; all movements of the joint limited. X-rays show a dislocation of the semilunar forwards with the ulnar half of the scaphoid which was broken; also a fracture through the base of the styloid process of the radius. Operation, October 22, 1920: Vertical dorsal incision to ulnar side of extensor carpi radialis under tourniquet. The joint was opened from the back and found to contain blood; the ulnar half of the scaphoid was displaced forward with the semilunar, the normal attachments of these bones being intact; long axis traction was made on the hand, and after a few attempts the bones were levered back into position while this traction was being maintained, the wrist being in a position of slight flexion; capsule and skin wound sutured. Subsequent treatment: The wrist was fixed in 10° of dorsi-flexion and radially deviated by means of a cock-up splint for three weeks. Voluntary movement of the fingers was carried out during this period. Splint removed at the end of three weeks, and the wrist strapped for another two weeks, after which full

movement was allowed. X-ray taken on December 1 shows bone in normal position, no union of the scaphoid fracture, union of styloid process of the radius.

Fractures of the semilunar are not so common, a type recognized and described by Granier [4] and also by Mouchet [5] is called a compression fracture. A case of what I take to be this type was shown by Mr. Roth at the Orthopædic Section on Tuesday last (December 7, 1920).¹

Case IV may have come in this category, but it is impossible to be sure as I have no X-ray photograph taken prior to his first operation. This case is also of interest as showing a scaphoid firmly united after a partial fracture, and also because of the severe degree of osteo-arthritis which has developed.

The operative approach in all the cases shown was the same. A short skin incision is made parallel to and just on the ulnar side of the extensor carpi radialis brevis tendon, with its centre at the level of the lower border of the radius; this tendon and that of the extensor longus pollicis are retracted radialwards. The joint capsule is opened usually by a vertical incision; when the wrist-joint is flexed the semilunar and inner part of the scaphoid can be inspected and the removal of either can be easily carried out.

This method of approach is, I think, much the most satisfactory one for dealing with the scaphoid, giving the maximum freedom of action with a minimum of damage to the soft parts. The same incision gives good access to the semilunar when this is associated with a fracture of the scaphoid. For a simple dislocation of the semilunar forward a palmar incision is preferred by Delbet and others. In all cases the operation was carried out under tourniquet, the large number of superficial veins in this region alone making this most desirable.

In conclusion I would suggest that early excision of the scaphoid should be carried out in all cases of fracture in men above the age of 25, as we know of no means of successfully overcoming the serious disability which frequently follows the injury when it is not so treated. Anatomically, it would appear that a better joint line could be obtained if the semilunar bone was also removed at the same time, but the clinical evidence which I have on the subject is not sufficient to enable me to form a definite judgment on the question. The majority of those who have written on the subject consider that removal of the ulnar

¹ See *Proceedings*, 1920, xiv (Sect. Surg., Sub.-sect. Orth.), p. 55.

part of the scaphoid bone alone is sufficient; it is certainly the simplest operation, but I think that at least the removal of the whole of this bone is best calculated to prevent the development of secondary arthritic changes.

In those cases which come under treatment late, and in which considerable osteo-arthritis of the wrist-joint has developed, I am convinced that satisfactory results can only be expected if at least the proximal row of carpal bone is removed.

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? Neoplasm of Lung.

By MAURICE CASSIDY, M.D.

C. V., AGED 50. In 1888 he was in Canada for two years working on a railway. Since that date he has been employed as a coal-porter in this country and enjoyed robust health till January, 1920, when he was laid up with influenza—pains in the head, back and limbs, and fever. He resumed work after two months and found that he was short of breath and had pain in the left side of the chest. Shortly after resuming work he had a slight hæmoptysis ("streaks of blood" for two days) and was admitted to St. Thomas's Hospital. On admission there was but slight dyspnœa on exertion; there was a little cough with no expectoration and he complained of pain in the left side of the chest. He was only a few pounds below his normal weight. The physical signs and X-ray appearances were as at the present time. The heart's apex is situated in the sixth space, $6\frac{1}{2}$ in. from the middle line. The second sound is somewhat low-pitched and accentuated in the first and second left intercostal spaces, but cannot be described as typically aneurysmal. There is a slight but definite tracheal tug. There is no diastolic shock and no abnormal pulsation. The pupils and pulses are equal. The whole of the front of the left side of the chest is dull and no breath sounds are audible. Behind, there is some impairment of note over the left supraspinous fossa, and breath sounds and vocal fremitus are much diminished all over the left lung. No glandular enlargements are detected and the spleen is not felt. The Wassermann

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reaction is completely negative (three examinations). There is no eosinophilia. No hydatid fluid has been available for a complement-fixation test.

REPORT OF X-RAY EXAMINATION BY SIR A. REID.

Left side of chest shows a homogeneous mass which includes heart shadow. The heart is obviously displaced to left but cannot be distinguished from mass either on screen or plate. The outer edge of opaque mass is sharply defined and leaves an area of clear lung below and external to it. Trachea is pulled over to left. The sharp outer border does not pulsate. Taking into consideration that the condition has not materially altered for nearly a year, malignant growth seems to be excluded. At lower margin calcified rib cartilages can be seen.

The only suggestion I can make is that there is present either a hydatid cyst, an encysted pleurisy or an innocent mediastinal tumour.

Treatment: He has taken potassium iodide 5 gr. t.d.s. since May.

Progress: He has gained weight and is now his normal weight (11 st. dressed). He feels in good health although still dyspnoeic on exertion and subject to pain in the left chest.

Case of Ununited Fracture of the Humerus treated by the Insertion of a Segment of Fibula into the Medullary Cavity.

By CECIL ROWNTREE, F.R.C.S.

PATIENT, a male adult, sustained a simple fracture of the humerus in February, 1919. Treatment by the ordinary methods resulted in a false joint. In June, 1919, the false joint was cut away and two steel plates were applied, but the screws pulled out and no union took place. In September, 1919, another plating operation was undertaken, but again the screws pulled. He was admitted into the hospital under my care in the early part of this year and the plates were removed, but the bones were found to be so attenuated that further plating or grafting appeared to offer very small prospect of success, and the man went home wearing a moulded splint which was of considerable assistance to him. On October 15 last he was persuaded to re-enter the hospital for further operative treatment. A good deal of bone was cut away, and a piece of the fibula about 3 in. in length was inserted into

the medullary cavity of the humerus. Union quickly took place, and the man is rapidly regaining a useful arm. No difficulty was occasioned by the injury to the fibula.

Case of Fracture of the Femur and Tibia of the same Leg.

By F. D. SANER, F.R.C.S.

LIEUTENANT L., aged 22. Severe motor-cycle accident August, 1919. Extreme comminution of the left femur with much displacement. Compound fracture of the left tibia. The wound of the leg



FIG. 1.
Left femur, August, 1919.



FIG. 2.
Left femur, October, 1919,
after operation.

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was immediately excised and closed by primary suture. Extension on the lower fragment was applied by means of a Sinclair's foot-piece. The femur was plated four weeks after the accident; the general condition did not permit it before this.



FIG. 3.
Left femur, July, 1920,
one year after operation.



FIG. 4.
Left tibia, August, 1919.

There is now, some sixteen months after the operation, firm union of the femur and tibia in good alignment. The movements of the hip and ankle joints are full, and the knee can be flexed to a right angle. There is slight lateral mobility of the knee. Patient is able to walk ten miles without any discomfort.



FIG. 5.

Left tibia, February, 1920.

Case of Hypopituitarism.

By A. W. SHEEN, C.B.E., M.S.

PATIENT, P. L., aged 53, was admitted to hospital for anal fistula. He is a very fat man, weighing 22 st., and states that a little more than a year ago he only weighed 14 st., producing a photograph which corroborates this. There is drowsiness, inertia and loss of sexual feeling. He eats very little; 250 grm. of glucose produced no glycosuria. An X-ray of the skull shows a normally sized sella turcica, and one of the hand (thickening along the edges of the proximal phalanges) indicating an earlier hyperpituitarism. There are no other symptoms. It is proposed to feed the patient with whole-gland pituitary extract.

I also show for comparison, the photograph of a "fat girl," aged about 17, from a travelling show, taken at autopsy, she having died a few hours after admission to hospital from calculous pyelo-nephritis. In spite of the enormous deposition of fat, the bones were small and fragile, indicating that anterior as well as posterior lobe action was deficient. The case occurred over twenty years ago and the pituitary body was not examined.

Case of Cavernous Nævus of the Foot.

By PHILIP TURNER, M.S.

V. V. N., A GIRL, aged 23, first noticed, thirteen years ago, a swelling on the dorsum of the right foot, which has slowly but steadily increased in size. The tumour is painless, but she complains of aching in the sole of the foot after much standing. The swelling, which is most prominent over the dorsal aspect of the tarsal bones, is soft, semi-fluctuating, and does not pulsate: it is not adherent to the skin, but appears to be connected with the deeper structures of the foot. It can be traced upwards in front of the ankle to the lower third of the leg, where it gradually disappears; downwards it can be traced over the metatarsals to the toes, all of which are also affected. The tumour increases in size when the foot hangs down and diminishes, but does not disappear when the foot is raised. The overlying skin is slightly blue in colour, and the tumour is not translucent. The movements of toes and ankles are unimpaired. Both feet show a slight degree of pes cavus. The diagnosis rests between that of a nævoid growth, possibly with a certain amount of fatty tissue, and that of a lymphangioma. The fact that what appears to be a dilated vein can be seen in the main mass of the swelling favours the diagnosis of nævoid growth. Owing to the slight character of the symptom, the slow rate of growth, and the possible connexion with veins in the sole of the foot, it is proposed for the present to keep the patient under observation and treat the swelling by an elastic bandage.

**Case of Osteo-chondritis Deformans (Legg's Disease or
Perthes' Disease).**

By C. W. BUCKLEY, M.D. (Buxton).

THIS case shows in an adult a condition which appears hitherto only to have been described in children, by A. T. Legg, of Boston, U.S.A. [1], in the first instance in 1909, and later by Perthes [2].



FIG. 1.

The characteristic feature is a marked disorganization of the head of the femur associated with little or no disability in walking, and equally little limitation in the movement of the joint. The skiagram (fig. 1), shows absence of the head of the femur and distortion of the neck, with in addition an isolated mass of bone. The process leading up to this condition has been described by McChesney as a progressive

destruction and crushing principally of the upper femoral epiphysis. At first sight the angle of the neck appears to be altered, but closer examination shows that the appearance is simply due to this process of crushing, and the neck springs from the shaft at the normal angle.

The condition usually shows itself in childhood through some slight injury which does not actually cause the trouble but reveals it. There is an error of development of the whole upper epiphysis which breaks into two or three pieces and finally unites irregularly to the neck. It may affect one or both sides. The absence of pain is an important feature in diagnosis from tubercular disease.

The case reported is of special interest since there were other evidences of defective bony growth. The patient was a Jewess, aged 32, who had always enjoyed good health, but had recently had pain in the hips after walking short distances. She had always been rather dwarfed in stature through shortness of the limbs, though the body was normal in size and general development. She was of active habit, and as a child could run about much as other children, though she appears to have been taken to doctors in early life on account of some trouble in walking; she began to walk at about the age of 18 months. Parents, brothers and sisters were normal and healthy, though her mother died when she was aged 10. Her gait was not noticeably abnormal, except so far as it was affected by the shortness of her legs, and there was free movement of the hips and all other joints in all directions. The muscles of the thighs were well developed, but otherwise the limbs were short and slender. Height 4 ft. 7½ in.; length of femur, 13½ in.; tibia 11 in.; ratio being approximately normal. Ratio of femur to height 0.244, compared with normal 0.275. Length of humerus, 8 in.; ulna, 8½ in. Hands and feet small. The left wrist was slightly broadened, and a skiagram showed this to be due to projection of the ulnar condyle; the ulna appears to have grown out of proportion to the radius to a slight degree; the carpus appears to be unusually small. The terminal phalanges presented a peculiar appearance; the palmar surface, that is the pulp of the fingers, apparently had grown more rapidly than the dorsal surface and the nails; this may be seen in the skiagram in the case of the thumb; the bones of the terminal phalanges are notably shortened (fig. 2). The spine is normal, no lordosis or curvature in any direction. Sexual development and functions normal, puberty at about the age of 14. Intelligence good. There is no enlargement of the ends of the long bones; the ribs are normal and the skull well formed.

The condition of the ulna and left carpus (the right was not skia-graphed, I regret to say, as the importance of the point was not appreciated at first) and the peculiarity of the terminal phalanges, together with the diminished size of the long bones, are all suggestive of a general failure to a slight extent in the development of the process of ossification. Probably the predominance of the symptoms in the hip-joint is to be explained by the insufficiency of bony development in



FIG. 2.

the epiphysis of the head, and consequently its inability to bear the weight of the body and the strains normally thrown upon that part of the bone, the result being an intracapsular fracture.

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Case of Sclerodactylia of the Hands with Multiple Telangiectases of the Skin and Mucous Membranes.

By F. PARKES WEBER, M.D., and BERNARD MYERS,
C.M.G., M.D.

MRS. W., aged 65, an out-patient at the Royal Waterloo Hospital on and off since last July. Her complaint was a painful condition of her fingers and a varicose ulcer of the left leg. She stated that she had never suffered from chilblains, but always had cold hands from her earliest infancy. For about twenty years there had been a condition of pins and needles and painful pads of fingers. The pain was much worse in the cold weather, but was relieved by warmth. She was in the habit of treating herself by plunging her hands into very hot water; this appears to have always given relief.

Eight years ago the terminal phalanx of the right forefinger became white, then blue and finally black. The condition spread to the remainder of the finger, the whole of which had to be amputated. All the fingers were apt to become white and then blue in cold weather, but no other finger had become black. Both syncopal and cyanosed states are painful, but the hot-water treatment never failed to give relief. The hands are warmer when in bed and after being rubbed. She lost the terminal phalanx of her left fore-finger many years ago through an accident. The feet have never been affected in a similar way to the hands. From time to time the right leg becomes œdematous, but this disappears with rest in bed. No swelling is seen under the eyelids in the mornings.

As far as she remembers the telangiectatic condition of the face, &c., was first observed some eight years ago. She has not suffered any inconvenience from it except that if she rubs any such part, more especially the lips and the fingers, it bleeds. The lips give the most trouble. Bleeding from the fingers can be stopped by immersing the part in hot water and then holding it up. When her cough becomes troublesome she has epistaxis. Patient has had a "winter cough" for several years.

Some twenty-four years ago she was treated by Dr. Colcott Fox for syphilis. She informed us that her husband had this complaint. The scar on her left cheek dates from this period.

Seven years ago she was treated for gastric ulcer with hæmatemesis at Portsmouth. There has not been any gastric trouble for two years.

The menses ceased at 46. The family history did not elicit anything of importance, there being no similar condition of the hands in other members of her family. We saw an elder sister who enjoys excellent health, but we noted a few small telangiectases on her cheeks and inside her mouth.

Present condition: A moderately healthy-looking woman for her age. The appetite is good and bowels open daily. Lips rather cyanotic. The fingers of each hand have a sort of peeled appearance. There is a little thickened skin over the flexor surfaces of the terminal phalanges of each hand. These phalanges are exceedingly tender and painful, more especially in cold weather. The hands are always better when she is in bed. The phalanges are a little pigmented. The tender and painful areas are continued around to the back of the fingers in the immediate vicinity of the nails only. The centres of the nails are very tender. The middle and ring fingers of the right hand are the worst and they show a slightly puckered appearance over the most tender spots. The patient has removed tiny concretions from her fingers at various times. Tiny pits mark the former locations. The concretions seems to be distinctly tender to the touch. None have been removed lately for examination. The little finger is less affected than the others. The thumb does not seem to trouble her much. A few of the finger nails have been involved. The left hand shows a somewhat similar condition to the right.

Two weeks ago the terminal phalanges of the fingers were slightly flexed on the middle phalanges. After remaining in bed for ten days this condition has disappeared, all of the fingers now being straight.

The feet are normal except for some small deformities due probably to tight boots.

The telangiectases previously mentioned are present on both sides of the face (some are of the spider variety), better marked on the right, the upper and lower lips, near the left inner canthus and over right upper lid, both ears but more especially the right, the forehead and the scalp. They are seen also on the neck, upper part of the right chest and a few on the buttocks. A similar condition is found on the tongue, gums, inside mouth and on hard palate. Mr. N. Biggs found some dilated vessels on the nasal mucous membrane, the posterior wall of pharynx, the post-nasal space and a few on the larynx. The latter are of the nature of telangiectases. Several of them situated on the face consist of a central

vessel communicating with dilated capillaries. Pulsation seems to be felt over the central vessel and pressure there stops the flow of blood into the dilated capillaries.

The cardiac apex beat is in the fifth space just outside the left nipple line. The heart's dullness extends to the third left cartilage, and just to the right of the sternum. There is reduplicated first sound at the apex. The pulse varies from 60 to 70 per minute. The blood-pressure is: systolic 158, diastolic 110, pulse-pressure 48. Arteries a little thickened. The lungs are emphysematous. The abdomen is prominent, due to flatulent condition of bowel apparently. The spleen is palpable and a little tender. There is a "varicose" ulcer above the left internal malleolus. The temperature while in hospital has varied from 97° F. to 98.4° F. The respirations are 20 per minute.

The amount of urine in ounces passed from 6 p.m. to 6 a.m. and 6 a.m. to 6 p.m. has been measured for six days:—

Night	...	13	6	8	10	16	10
Day	...	9	12	10	6	14	20

Only on one occasion was the urine mixed with the fæces. She drinks between 30 to 40 oz. in the twenty-four hours. She states that she does not perspire. Urinary analysis: Specific gravity, 1014; reaction neutral; albumin, a trace; no sugar, diacetic acid or acetone; urea 2.6 per cent.; no excess of indican; a few hyaline casts; no blood, pus or crystals; a deposit of urates.

The thyroid gland seems to be atrophied.

The Wassermann reaction was negative. A provocative dose of 0.3 gm. of novarsenobillon was given and the result was again negative.

The hæmoglobin in the blood is 85 per cent. The erythrocytes are 5,040,000 per cubic millimetre. Colour index equals 0.85 approximately. White cells, 7,200 per cubic millimetre; polymorphonuclears, 70.2 per cent.; lymphocytes, 22.6 per cent.; large mononuclears, 4.2 per cent.; transitionals, 1.8 per cent.; eosinophils, 1.2 per cent.

Mr. Bickerton reported on the eyes: "Right disc normal; vessels normal; left disc shelved cupping: left vision $\frac{6}{24}$, with + 2.75 sph. = $\frac{6}{6}$."

Mr. Martin Berry's X-ray report: "Chest—Fibrosis in lung roots, but no calcareous glands. Feet—Slight general bony rarefaction and some atrophy of shafts of first phalanges of all toes except big toes; this gives the appearance of enlargement of the bone ends, and possibly there is actually slight enlargement; bony spur on terminal phalanx of right big toe. All other phalanges and joint spaces normal. Hands—

General transparency of all bones but no true atrophy. Amputation of whole of right index finger and terminal phalanx of left index finger; stumps healthy; no other abnormality in hands."

Treatment: Thyroid gland 1 gr. thrice daily p.c. has been tried in this case for a few weeks and then discontinued. The patient states that she felt distinctly better generally while taking the thyroid, and that the condition of the fingers seemed to improve a little.

Acute Anterior Poliomyelitis in an Adult.

By F. PARKES WEBER, M.D.

THE patient, S. O., is a fairly well-developed young English woman, aged 23, who was admitted to hospital on October 23, 1920, giving a history of having fallen ill with supposed influenza ten days previously. During the last five days she had had weakness in the right upper extremity and in some of the muscles of the right side of the neck and trunk, which prevented her from sitting up in bed without support. In the hospital the temperature was 100° F. on admission, but afterwards did not rise above 99° F. There was marked tremulousness in putting out the tongue, and to a lesser extent in the lips when talking, very similar to that met with in cases of epidemic encephalitis. Knee-jerks active. No ankle clonus. No Babinski's sign. No evidence of disease in the thoracic or abdominal viscera. Urine, free from albumin and sugar. No ocular paralyses and nothing abnormal by ophthalmoscopic examination. Wassermann reaction negative.

The general condition gradually improved in the hospital, but the illness has left paralysis of the right serratus magnus muscle and paresis, with considerable wasting, of the right deltoid muscle.

Chronic Jaundice in a Young Woman, with Enlargement of the Spleen and Liver.

By F. PARKES WEBER, M.D.

THE patient, A. L., a Polish Hebrew young woman, aged 23, was first noticed to be jaundiced in 1917. About that time she complained of a dull pain in the right lumbar region, extending forwards towards

the right hypochondriac region; this pain passed off in a few weeks, but in 1919 she suffered from temporary severe pains in the same region, which "doubled her up" and "caused her to sweat." In 1918 she had a good deal of pruritus. The jaundice has persisted since it was first noticed in 1917, but the degree of the icteric coloration has varied from time to time. There is a depressed scar on the lower left front portion of the thorax, possibly due to former bone tuberculosis. The spleen and liver can be felt considerably enlarged. The urine is high coloured, giving at present a definite but slight Gmelin's reaction for bilirubin; it shows no excess of urobilin or urobilinogen; it is acid, and free from albumin and sugar. The fæces are not quite "acholic," but are usually very pale in colour. Blood count: Erythrocytes, 5,400,000 to 6,100,000 per cubic millimetre of blood; white cells, 7,500 to 12,000; hæmoglobin, slightly above 100 per cent. The blood-serum gives a negative Wassermann reaction. Professor Leonard Dudgeon kindly informs me (December, 1920) that the patient's blood shows no abnormal fragility of the erythrocytes to hypotonic saline solutions, at least nothing to suggest congenital or familial "hæmolytic" jaundice. The end point is 0.42 per cent. pure sodium chloride in distilled water. He says that her blood-serum gives a strong reaction for bilirubin. I think the case is one of hepatic cirrhosis with chronic jaundice and enlargement of the liver and spleen, either of the nature of a biliary cirrhosis or else (less probably) of Banti's disease. There is, however, no leucopenia as yet. I take it that in Banti's disease the liver may be affected simultaneously with the spleen, and that the hepatic disease is not necessarily secondary to the morbid process in the liver.

I am not in favour of recommending splenectomy in the present case.

There is no history of jaundice in the family, except that one of the patient's sisters died at about the age of 12 with "dropsy and jaundice." The patient's father and mother are both living in Poland. She has had nine brothers and sisters, of whom four are living and healthy and five (including the above-mentioned sister) are dead. Alcoholism can be definitely excluded in regard to my patient.

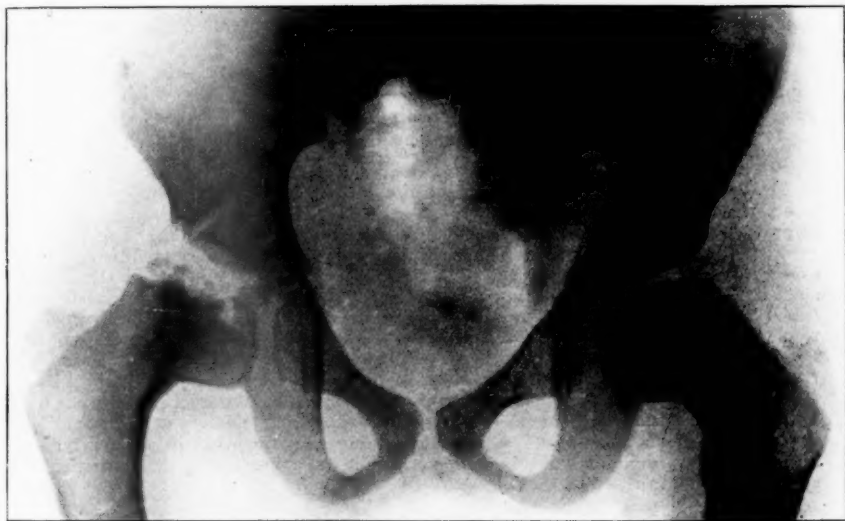
Clinical Section.

President—Sir ANTHONY BOWLBY, K.C.B., K.C.M.G., K.C.V.O.

Case of Osteo-chondritis Deformans.¹

By W. E. TANNER, M.S.

M. S., MALE, third child. Parents are first cousins. Other children quite healthy. Born on March 7, 1913; weighed 8 lb. at birth. Said to be poorly nourished; was breast fed and rapidly improved. Teething commenced when 8 months old and completed at 2 years and 3 months. When 9 months old fell out of his perambulator on to a thick Axminster carpet but did not cry and no bruising was found.



Commenced to walk normally at 14 months. When 2½ years old complained of pain in right foot when getting off a chair and went off his feet for a week. Seen by a doctor who found no abnormality in feet or hips and diagnosed "rheumatism." Was not encouraged to walk but did so on his own initiative. At this time he lost 6 lb. in weight in six weeks and "never was so bonny again." After this the gait was always unnatural but he did not complain of pain and was always active on his feet.

Until 7 years old was always put to bed in the afternoon.

¹ At a meeting of the Section, held January 14, 1921.

58 Spencer: *Left Subclavian Artery ligatured for Aneurysm*

When seen in September, 1920, the gait suggested that right leg was shorter than left, but no difference was found on measurement. Abduction of right hip slightly limited but painless; all other movements free and painless. On standing, right trochanter and anterior superior spine were raised half an inch. Trochanter prominent. The condition was thought to be due to a rachitic coxa vara or to a subacute infective epiphysitis.

The joints were examined under X-rays by Mr. Magnus Redding who reported as follows: "There is no bony abnormality of the knees or ankles. There is a moderate degree of coxa vara deformity of both hips, more marked in the right than in the left. The deformity is situated in the necks of the femora, immediately on the diaphyseal side of the epiphyseal lines. There is no evidence of bony injury. The necks of the femora are increased in vertical depth near the epiphyseal lines, and the epiphyseal cartilages are set obliquely, so that the extremities of the diaphyses show as broad ovals instead of being seen in profile. Ossification in the epiphyses of the heads of the femora is very retarded and irregular, the heads appearing split up. These changes are more marked in the right side. The acetabula on both sides are poorly developed, and the left acetabulum shows a moderate degree of irregularity. The epiphysis of the left great trochanter also shows irregularity of ossification. The X-ray appearances suggest a bilateral condition analogous to pseudo-coxalgia" (see figure, p. 57).

The double walking calliper was fitted in November. He is having thyroid gland $\frac{1}{4}$ gr. twice a day, bynol, and ordinary diet with cream. Exercises for ten minutes night and morning.

General condition has improved and he has gained 9 lb. in weight in three months.

Dr. BUCKLEY considered the amount of disability in walking shown by the patient was much greater than had been generally described and very much greater than in his own case shown at the previous meeting. It was also to be noted that the morbid process appeared to be limited to the head of the bone; the neck had escaped to a great extent; this might be due to the care that had been taken to secure rest for the limb since the first appearance of symptoms. He believed that the disorder was due to a defect in the process of ossification so that the bone was not equal to the strains which would normally be placed upon it, and something akin to a greenstick intracapsular fracture resulted. It was important in all cases carefully to examine the other bones of the limbs to detect any other evidence of defective bony development. Stress must be laid on the fact that the condition was not an arthritis; if the interior of the joint could be examined he believed it would be found to show no inflammatory changes at all; the freedom of movement and absence of pain were quite inconsistent with an arthritis, and the importance of this distinction had been emphasized by those American surgeons who had written on the subject.

Exhibition of a Patient in whom the late Colonel Charles Stonham ligatured the First Part of the Left Subclavian Artery for Aneurysm in 1899.¹

By W. G. SPENCER, O.B.E., M.S.

THE man when admitted to the Westminster Hospital at the age of 43, presented an aneurysm of the second and third part of the left subclavian artery, the size of a duck's egg. He had had syphilis fourteen years before;

¹ See *Lancet*, 1902, ii, p. 291.

three years before he had been in a hospital for ten months, suffering from (? syphilitic) bronchitis with profuse hæmoptysis, which was however diagnosed as incurable phthisis. There was a gumma on the left clavicle, and another on the left thigh.

On April 26, 1899, Stonham, assisted by the late Percy Paton, ligatured the first part of the left subclavian artery. He first excised the inner end of the clavicle, then exposed the left common carotid; two-thirds of an inch directly behind the carotid was the left subclavian artery surrounded by loose fat. On the outer side and below was the dome of the pleura, the subclavian and jugular veins with the thoracic duct joining to form the left innominate vein. Pulsation in the aneurysm recurred, and on June 28, 1899, the vertebral and inferior thyroid arteries were tied by reopening the previous wound upwards, also the third part of the subclavian was tied through the axilla.

The patient has been readmitted complaining of severe pain in the course of the sixth to the ninth left intercostal nerves. He is now aged 65, has a distinctly emphysematous rigid chest; there is no sign of the former aneurysm except the scars. A skiagram of the chest, as also auscultation, has failed to produce positive evidence of a thoracic aneurysm.

REFERENCE.

HALSTED, W. S. "Ligations of the Left Subclavian Artery in its First Portion," *Johns Hopkins Hosp. Reports*, 1920, xxi, pp. 1-96.

Dr. F. PARKES WEBER remarked that a point of great medical interest in the case was the history of previous hæmoptysis, together with the diagnosis made at some hospital of pulmonary tuberculosis. At that time the existence of pulmonary syphilis, such as could be mistaken for tuberculosis, was hardly admitted. Even in 1916, when he (Dr. Weber) read a paper on six cases of "Acquired Syphilis of the Lungs," before the Section of Medicine,¹ he was informed by a pathological authority that evidence of syphilis of the lungs was hardly ever met with at post-mortem examinations. Anyhow, the clinical recognition of the possibility of various disease cases of pulmonary disease being due to syphilis was of the utmost importance, and great harm might result from incorrectly diagnosing a case of pulmonary syphilis as one of tuberculosis. The fibrotic form of pulmonary syphilis might be very insidious in its onset and doubtless frequently escaped recognition till much damage was done.

Epithelioma supervening on Scar Eight Years after Destruction of a Hairy Mole by X-rays.

By W. G. SPENCER, O.B.E., M.S.

PATIENT, a female, aged 38, by occupation a cook. History: Hairy mole on left temple. Eight years ago monthly exposures for two years to X-rays. After final exposure scar remained sound until three months ago. There is now an epitheliomatous ulcer at outer angle of left eye, infiltrating eyelids; also keratosis in patches over scarred area.

¹ F. Parkes Weber, *Proc. Roy. Soc. Med.*, 1916-17, x (Sect. Med.), p. 23.

Submammary Tumour of the Chest Wall.

By PHILIP TURNER, M.S., and L. MANDEL, M.D.

PATIENT, a widow, aged 46, with one daughter aged 18, complains of a tumour in the region of the right breast which has developed in the course of the past few months. About eight or nine years ago she had an accident—severe blow on right side of chest from the open door of a moving railway carriage. A swelling was noticed some two or three weeks afterwards and the doctor in attendance told her that she had broken three ribs. This swelling never completely disappeared: some irregularity could be felt beneath the right breast, but she says that in appearance there was no difference from the other side.

Two or three months ago patient noticed that the right breast was becoming more prominent and that there was a hard lump to be felt. She says that the present tumour occupies much the same position as the "irregularity" which persisted after the injury to the ribs. There has been but little pain; her general health has not been affected though she thinks she has lost weight to a slight extent; but the lump has steadily increased in size.

On examination, right breast is seen to be unduly prominent and on palpation this is found to be due to a hard swelling about the size of a fist, which is adherent to chest wall by a broad attachment. Its surface is lobulated and, especially on the outer side, it has an overhanging edge. The skin is freely movable over the tumour and there is a good thickness of tissue, probably breast, between them. Nipple normal and similar in appearance to that of other side. No enlarged axillary glands. Patient has not had a cough and examination of lungs shows no abnormal physical signs.

Mr. J. Magnus Redding has furnished the following report of his X-ray examination: "The tumour shows considerable opacity to radiation which renders it difficult to get a satisfactory view of the underlying ribs. There does not appear to be any destruction of bone, but the upper border of the fourth rib shows a clearly defined defect near the costo-chondral junction. Seen in profile the tumour shows some irregular ossification not directly continuous with the ribs. The tumour does not appear to extend into the cavity of the chest and no intrathoracic abnormality can be seen. The X-ray appearance suggests that the tumour is an ossifying chondroma connected with the fourth rib."

The recent rapid increase in size suggests the probability of the growth being a sarcoma with secondary calcification and ossification, though the X-ray examination, in the absence of any erosion of the ribs, seems to be against this view. The growth has not extended inwards, and there is no indication of secondary formations or direct invasion of the lung; its removal is therefore called for.

Postscript.—At the operation, which was performed under intratracheal anaesthesia, the tumour was found to extend considerably into the thoracic cavity. The growth, with portions of three ribs, was excised. Histologically it proved to be a chondroma. The patient has done well.

Case of Extreme Dislocation of the Heart into the Right Axilla.

Shown by Dr. J. A. BIRRELL.

(Introduced by Dr. BATTY SHAW.)

A. W., AGED 39, was admitted recently to the Brompton Hospital for observation. He was passed fit for military service in 1915. Previously he had worked for seventeen years in a pill factory and had apparently been free from any disease. In the winter of 1915-16, he developed a cough, but was kept on duty and in the following summer he collapsed from shortness of breath whilst "doubling" with a gas-mask on. After another medical examination he was at once returned to duty. In 1917 he received a shrapnel wound in right calf and popliteal region, but does not remember being struck on chest. The wound was treated surgically under a general anaesthetic a few days later and shortly after he developed fever which lasted three weeks and he says he wore a "pneumonia jacket." Upon the temperature subsiding, he was transferred to England, where in 1918 he was informed that his heart was beating in the wrong side of his chest and he began to notice a sensation of thumping in same position after exertion. He was discharged unfit for further service on May 16, 1918, on account of gunshot wound and pulmonary tuberculosis.

At present he has cough, with yellowish-green expectoration. Repeated examinations fail to show presence of tubercle bacilli or of elastic tissue; pneumococci, streptococci and *Micrococci catarrhales* are present; temperature and pulse normal; he is short of breath on effort.

On physical examination heart is found dislocated so far to the right that its impulse can be felt in the fifth intercostal space in right axillary line. Percussion shows corresponding dislocation of heart to right, so that left border of heart is in the fifth right space, 3 in. from middle line of body. No murmurs, but aortic second sound very accentuated, and best heard in dome of right axilla. On X-ray examination Dr. Stanley Melville finds that: Heart lies close against outer wall of right chest, and diaphragm is 1 in. higher than normal. Outlines of aorta cannot be defined. Trachea transparency visible at right border of sternum. When patient swallows barium sulphate, shadow can be followed down right border of vertebral column, until it crosses spine to reach stomach.

Clinical examination shows right lung to be much contracted; the most marked signs are heard on posterior aspect of chest; the whole right chest is dull to percussion and very dull from level of sixth dorsal spine to the lower costal margin. Cavernous breathing and whispering pectoriloquy are audible in the right interscapular and infrascapular areas, and at inferior scapular angle râles are occasionally to be heard, especially after a cough. No clubbing of fingers; dorsal spine concave to right and trachea is seen to be dislocated to right of middle line. Dr. Stanley Melville could not demonstrate any foreign body in air passages and found signs in right lung indicative of collapse of right lower lobe.

Wassermann test applied to blood: negative.

The case is shown (1) because of the extreme dislocation of the heart; (2) because of the difficulty in explaining the condition of the right lung,

which does not appear to be due to bronchiectasis or to tuberculosis, but is suggestive of the pleurogenous pneumonia of Sir Andrew Clark. Were it not a fact that the patient had had a history suggesting pulmonary disorder, slight though it was in degree, before the shrapnel wound, an explanation could be found for the state of the right lung; that its present condition is the result (a) of pneumonia developing at the time of the shrapnel wound of the leg, or just subsequently; (b) that it is the result of massive collapse of the lung, though there is no evidence to support the view that massive collapse of the lung could persist and lead to such disorganization of the right lung as is shown in this case.

Dr. F. PARKES WEBER thought the most probable explanation was that the patient had congenital dextrocardia, and that about the time of the operation (two years or more ago) a right-sided pleuritic effusion occurred, which led to permanent splenization and shrinking of the lower part of the lung. It would be interesting if further skiagrams could be taken from various aspects, so as to more exactly ascertain the position of the heart and aorta and show what portion of the heart it was that could be felt pulsating in the right axillary line.

Case of Mycotic Aneurysm of the Right Calf.

Shown by Dr. V. WILKINSON.

(Introduced by Dr. BATTY SHAW.)

PATIENT, aged 37, formerly a pianoforte-maker, and now a discharged soldier, was recently admitted to University College Hospital because a few weeks previously he developed severe pain and swelling in right calf; these symptoms abated somewhat with rest and it was then discovered that the swollen calf pulsated. Suffered from "rheumatic pains" till 14 years old and four years ago contracted syphilis. Entered Army in 1916 and was discharged with valvular disease of heart in February, 1919. Since leaving Army has become shorter of breath, and begun to sweat rather profusely at night and pain has developed over heart. Was first admitted to University College Hospital in June, 1920, when double mitral disease was found; spleen was enlarged, fingers clubbed, there was occasional evening temperature and the Wassermann test was found to be positive; the heart was not enlarged. Was readmitted to University College Hospital on January 8, 1921. States that fourteen weeks ago he noticed pain in right leg just above ankle on the inner side. Fomentations gave relief and nothing further happened until four weeks ago when calf of right leg became painful and swollen.

Right calf now obviously enlarged, is tender to touch and pulsates. Pulsation ceases and the swelling diminishes in size when right femoral artery is compressed. Heart now found to be enlarged to right and to left and a loud early diastolic murmur indicating aortic regurgitation has developed since he was admitted to hospital last year. In addition to the other signs then found patient has begun to look ill; there is blood and albumin in the urine, there is constant temperature, loss of weight and progressive secondary anæmia, leucocytes now amounting to 6,000 per cubic millimetre.

The case is shown as a rather unusual example of mycotic aneurysm occurring in malignant endocarditis.

Dr. F. PARKES WEBER agreed that the case was one of chronic malignant endocarditis, supervening on old rheumatic valvular disease. Owing to the advanced stage of the malignant endocarditis he thought that any surgical interference with the mycotic aneurysm in the leg was not advisable. In regard to general treatment he thought that vaccine therapy would probably prove useless, even if streptococci could be cultivated from the patient's blood.

Postscript.—As a result of the discussion of the case, it is probable that the diagnosis of mycotic aneurysm is wrong and that the case is merely one of rupture of a branch of the posterior tibial artery and the formation of a false aneurysm.

Two Cases of Dupuytren's Fracture treated by Screws.

By W. H. OGILVIE, M.A., M.Ch., F.R.C.S., and GRANT MASSIE.

REMARKS BY MR. OGILVIE.

MY interest in these two cases is an indirect one, for they were both operated upon by Mr. Massie, who will show you the X-ray plates and give you details about the patients. I should like however to raise the general question of the treatment of abduction fractures at the ankle-joint, and learn the views of other members of the Section on this subject. I am not by any means a believer in the necessity or advisability of operation in the great majority of simple fractures, but in Dupuytren's fracture, of which these two cases are examples, I believe it to be impossible to get even a passable result by other means. These abduction fractures seem to fall into three classes—those which do not need operation at all, those which must be operated upon, and those on which one would like to operate but cannot.

In the first class I would put all those cases described as Pott's fracture, whether there be no more than a fracture of the internal malleolus and of the fibula above the joint without a dislocation, or whether there be, in addition, fractures of the articular surface of the tibia and a backward and outward displacement at the ankle-joint. In all these cases, so long as there is no separation at the inferior tibio-fibular joint, I think that reduction under an anæsthetic followed by fixation in plaster in a position of full inversion and full dorsiflexion, as recommended by Sir Robert Jones, will give an excellent result anatomically and functionally. A "Z" tenotomy of the tendo Achillis is sometimes, but not usually, necessary in addition.

Where there is separation at the inferior tibio-fibular joint, and this is usually due to a flake from the tibia or fibula being torn off by the powerful inferior tibio-fibular ligaments rather than to rupture of the ligaments themselves, I have always failed to get a satisfactory result by non-operative means. It is impossible by splinting to bring to bear on the malleoli an effective lateral pressure which will reduce the dislocation, and, were it possible, the skin over the malleoli would not stand such a pressure long enough to allow satisfactory repair to take place. Besides the outer edge of the astragalus is constantly being pulled up between the two bones and tending to reproduce the deformity, and even if repair has been apparently satisfactory, the young callus is so soft for several months that it will yield to this wedge action of the astragalus as soon as weight bearing is allowed. Once the mortise shape of the tibio-fibular surfaces is lost, further separation is inevitable, and a position of extreme valgus is the certain result. In these cases, after reduction of the

deformity, a single $1\frac{1}{2}$ in. screw driven in an inward and upward direction through the external malleolus into the tibia will effectively fix the fragments. A plate is necessary. I think that you will agree that the anatomical result in Mr. Massie's cases is good, and, considering the short time that has elapsed since operation, the functional result is also satisfactory.

Unfortunately a great number of cases forming my third class show a further degree of this injury, since there is also much comminution of the



FIG. 1.

external malleolus and of the articular surface of the tibia, in addition to the separation at the inferior tibio-fibular joint. I show you radiograms of such a case recently admitted to Guy's Hospital (figs. 1, 2). Here there is such a degree of comminution that there is no sound bone in which to fix a long screw, and it is very hard to decide on the best line of treatment. In a recent case I obtained a passable result by giving an anaesthetic in the fourth week, when there was a fair amount of sticky callus, tenotomizing the tendo Achillis, and then with a Thomas's wrench reducing first the backward dislocation and then the eversion and separation of the malleoli. In the case shown

there is a large wound opening up the ankle and subastragaloid joints, and we are using continuous traction on the os calcis by means of a Chutro's stirrup.

CASE HISTORIES, DESCRIBED BY MR. GRANT MASSIE.

Case I.—G. S., aged 47. Admitted to hospital on November 20, 1920, following injury to left ankle. Radiogram (November 20, 1920) showed vertical fissure in lower end of fibula, starting in inferior tibio-fibular joint, and complete separation of the lower part of internal malleolus. This fragment had moved upwards and separated the remaining part of malleolus from inner articular surface of astragalus. Astragalus was abducted. Operation (November 22, 1920): Tourniquet applied to limb and curved incision made,

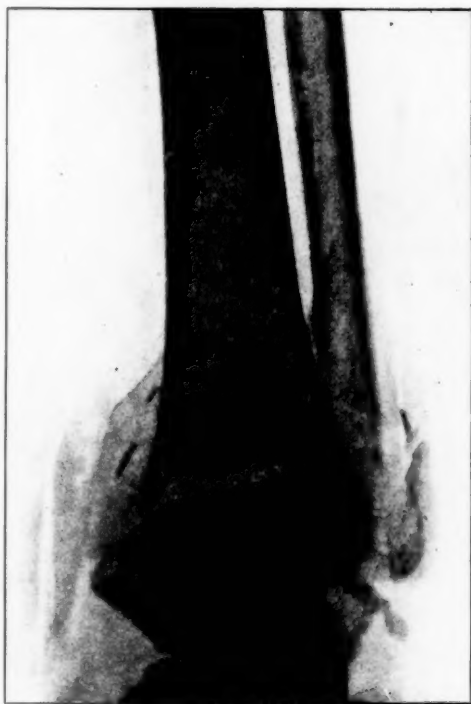


FIG. 2.

exposing lower third of fibula with its convexity forward. The periosteum was divided and retracted, and lower fragment of fibula restored to normal position and screw inserted upwards and inwards. Manipulation failed to replace displaced fragment of internal malleolus and an incision was made exposing it—small screw inserted vertically and fragment restored to the normal position. The operation was completed. Tourniquet then removed and ankle firmly bandaged. After treatment: Ankle gently moved on second day and movement gradually increased. Patient was discharged on December 11, 1920, and later attended the massage department.

MY—8a

Case II.—A. W., aged 42, female. Admitted to hospital on November 22, 1920, following injury to left ankle. Radiogram (November 22, 1920) showed fracture of internal malleolus and long oblique fracture of the fibula in its lower third. There was moderate degree of abduction of foot (fig. 3). Operation (November 25, 1920): Tourniquet applied to limb, and a curved incision made exposing lower third of fibula with its convexity forwards. Subcutaneous tissues were found to be infiltrated with blood—periosteum was divided and



FIG. 3.—Case II. Before operation. Showing well-marked separation at the inferior tibio-fibular joint.



FIG. 4.—After operation.

retracted and site of fracture identified; ends of the fibula were replaced in their normal position and screw inserted on outer surface of external malleolus passing upwards and inwards through the inferior tibio-fibular joint. Operation was then completed, tourniquet removed and ankle firmly bandaged—there was very little bleeding (fig. 4). After-treatment: Ankle was gently moved on second day, and movement was gradually increased. Patient was subsequently discharged on December 13, 1920, and later attended massage department.

Clinical Section.

President—Sir ANTHONY BOWLBY, K.C.B., K.C.M.G., K.C.V.O.

Cases illustrating Plastic Surgery of the Face.¹

By T. POMFRET KILNER, M.B.

Case I.—Sapper H., Royal Engineers, wounded in March, 1915. Discharged from Army when wounds were healed. Admitted Queen's Hospital, Sidcup, from home, July 12, 1919.

Condition on Admission.—Severe facial deformity. Almost whole of both maxillæ separated from remainder of facial skeleton by loss of large wedge of all tissues, base upwards and forwards. Fracture of mandible united. Patient was in a condition of misery. Fragments of food constantly passing up along the line of fracture into the antra and nose, and there giving rise to disagreeable smell by their decomposition. Masticatory disability extreme.

Operative Treatment.—Removal of loose portion of maxillæ by way of mouth. Immediate filling of cavity thus formed by dental composition fixed to dental plate prepared in readiness for operation. Later, rhinoplasty by forehead flap after preliminary operations to establish airway and free lower segment of nose. Forehead skin-grafted. Scar of right cheek excised and cheek tissues raised and anchored in better position by deep sutures to malar periosteum. Cavity filled later by prosthesis of hollow-box type and bearing teeth, made by Mr. A. L. Fraser.

Remarks.—Apart from its plastic interest, the case well shows the advantages of co-operation with a dental surgeon for the immediate treatment of such cavities as may be left by the removal of parts of the facial skeleton. When a raw surface remains at the end of the operation, skin-grafting may be carried out by Thiersch grafts applied on the dental composition.

Case II.—Sergeant F., Royal Engineers. Cordite burns, November 27, 1918. Admitted Queen's Hospital, Sidcup, June 12, 1919.

Condition on Admission.—Severe burns of face, scalp and hands in unhealed condition. Marked ectropion of eyelids.

Operative Treatment.—Thiersch skin-grafts for cure of ectropion. Full-thickness skin-grafts to upper and lower lips to correct eversion. Tubed pedicle flap formed on right side of abdominal wall. Removal of scar tissue from dorsum of hand and suture of opened-up tubed flap to provide healthy skin covering; arm held in position by plaster bandage.

The case illustrates the application to a general surgical condition of the tube-pedicle method, devised by Mr. H. D. Gillies for the repair of facial defects.

Case III.—Gunner M., Royal Garrison Artillery, wounded June 22, 1918. Admitted Queen's Hospital, Sidcup, March 14, 1919.

Condition on Admission.—Wounds healed. Loss of all soft tissues and bone in region of chin and lower lip. Profuse dribbling of saliva. Tongue uninjured.

¹ At a meeting of the Section, held March 11, 1921.

Operative Treatment.—Artificial chin piece constructed by Mr. Fraser. Chin region built up over this by means of in-turned flaps for lining and the whole of the forehead skin, brought down on two temporal artery pedicles, for covering. Pedicles returned and forehead covered by full-thickness skin-graft from arm. Method of dressing graft so as to maintain even pressure illustrated by actual dressing, dental composition applied over silver foil, used in this case. Red margin of lower lip formed by small mucous membrane flaps from the mouth.

Apart from its plastic interest, the case shows a very large successful full-thickness graft, and indicates the possibility of using the method more extensively in general surgical procedures.

Hair-balls or Hair-casts of the Stomach and Gastro-intestinal Tract.

By IVOR J. DAVIES, M.D.

Synonyms.—Hair-ball, hair-cast, hair-mass, trichobezoar, or phytotrichobezoar, tumeur pileuse.

Case I.—Mrs. E. P., aged 34.

History.—Had always enjoyed good health until six months before admission to hospital, when lower limbs became swollen; soon afterwards she observed her abdomen was swollen; it continued to increase in size afterwards. Also suffered from breathlessness and palpitation on exertion. Indigestion had been present for some years, lately assuming form of pain and vomiting after meals, with streaky hæmatemesis on a few occasions. A few days before admission to hospital upper limbs had become swollen, and lately headache and sleeplessness had been troublesome. Amenorrhœa present for past eight months, and for some time previously menstruation had become irregular and scanty. The urine had lately diminished in amount, and was passed with a little difficulty. The bowels were freely opened, with tendency to diarrhœa. Three healthy children, youngest 1 year 7 months old.

Family History.—Unimportant; patient had never shown any sign of unsoundness of mind.

Condition of Admission.—Patient first seen in Gynæcological Out-patient Department, King Edward Hospital, Cardiff, by Dr. E. Tenison Collins, as an unusual form of pregnancy was believed to be present by practitioner in charge of case. Dr. Collins passed case on to Medical Out-patient Department, remarking "the tumour is a peculiar one, but it does not belong to my department." Patient somewhat sallow, moderate œdema of limbs; fairly well nourished. Mental condition appeared normal. Tongue slightly furred, teeth deficient and carious. The breath not fetid. Heart and lungs normal. Abdomen distended; found on palpation to be occupied by large mass extending from left hypochondrium, across and below umbilical region, and upwards to right costal margin. Shape crescentic with sharp depression on upper surface. Outline definite; surface hard and smooth and free from tenderness. Mass freely movable in all directions; pain entirely absent on manipulation. Normal splenic dullness present, and merged at costal margin into that of the mass. Urine was of specific gravity 1020, and except for being high coloured was otherwise normal.

Diagnosis.—Indefinite, features unusual, not appearing to belong to any known clinical entity. For purpose of immediate admission to hospital, provisional diagnosis of splenic anæmia was made, but with much doubt, as only point of resemblance to splenomegaly consisted in sharp depression on mass superiorly, with slight degree of anæmia.

Patient admitted to a medical ward, and afterwards transferred for operation under care of Mr. Cornelius Griffiths.

Progress.—In the ward the idea of pregnancy was revived by the House Surgeon, who states "external ballotement is obtained, and hard parts can be felt *per abdomen* and are firm and rounded, and are all connected and can be freely moved apparently in a fluid sac. No foetal heart sounds can be heard; and no foetal parts can be definitely made out."

The case excited a great deal of interest and almost everyone differed in opinion. Mr. Cornelius Griffiths suggested that the condition was a tumour of the stomach. A moderate degree of secondary anæmia was present.

The radiographic report was as follows: Examination required—? *fœtus*. Report: "Shows no definite shadow." "A *fœtus* does not show *in utero*." The radiographer, Dr. Owen Rhys, was not asked to make an examination of the stomach, or the true nature of the case might have been discovered.

The general state was well maintained over a period of fourteen days before operation, but vomiting, at first slight, became more marked, especially in the evenings.

The bowels on an average were opened daily without an aperient, but on a few occasions a simple enema was necessary. The urine was at times scanty, and varied from 4 to 32 oz. daily, and, except for an excess of pigment and mucus, was free from abnormality.

Operation by Mr. Cornelius Griffiths.—Laparotomy: $4\frac{1}{2}$ in. incision over the right rectus muscle. The stomach was found to be enormously dilated and filled by a compact mass of hair, which formed a perfect cast of the outline of the stomach and pylorus. All other organs were found to be normal. Weight of the hair-ball on removal, $6\frac{1}{2}$ lb. Length along its greater curvature, $24\frac{1}{2}$ in. or 62 cm.; and its greatest circumference was $12\frac{1}{2}$ in. or 31.3 cm. The hairs varied from 6 to 12 in. in length, and were dark in colour and similar to those of the patient. The mass was thickly covered with a slimy, foul-smelling mucus, together with flakes of a sebaceous or adipocere material. The stomach wall was hypertrophied, and its mucous membrane showed a condition of gastritis in places, and also areas denuded of epithelium having a glistening appearance similar to that of leukoplakia. The patient bore the anæsthetic and operation well, but an hour later collapsed, and despite energetic stimulation she died. The hair-mass removed in this case is the largest on record.

Remarks.—On inquiry from the relatives no history of mental deficiency or of hair eating was obtained. The hair on the scalp was scanty; but no importance was attached to this fact, and afterwards the nurse in charge of the case stated that the patient on one occasion made the following remark: "I used to have a lot of hair, and have lost it. My hair used to be below my waist—now look how short it is." She volunteered no further information, but if the above remark had been reported by the nurse it is possible that a suspicion of the true condition might have occurred to one of us. The House Surgeon in his note made an important observation; which although wrongly interpreted, was a correct impression of the free movement of the mass on palpation. He remarked upon "the free movement of the mass apparently in

a fluid sac." The most striking impression obtained from the published records of hair-ball of the stomach is the free mobility of a hard, smooth, mass on manipulation. If this fact be borne in mind, then the possibility of hair-ball will be remembered, and a diagnosis can afterwards be definitely established by radiography.

Case II.—Mrs. M. E., aged 33. Admitted to the King Edward Hospital, Cardiff, under care of Mr. A. W. Sheen.

History.—Patient quite well up to three years ago, when she noticed lump on right side of abdomen which gradually got larger. A year later she suffered at intervals from morning vomiting, but never after meals. Occasional slight pain felt in the swelling. At times lump appeared to get smaller with passage of an increased amount of urine.

Previous and Subsequent Health.—Good, except for temporary mental disturbance of six months' duration, a twelve-month after the operation, from which she appears to have made a complete recovery. Four healthy children.

Family History.—Unimportant.

Present Condition.—Healthy looking, well nourished woman. Heart and lungs normal.

On abdominal examination, hard, rounded, smooth, movable, painless lump found in right lumbar region, which did not appear to fill loin. A dull note obtained on percussion, but non-continuous with liver dullness.

Operation by Mr. Sheen (eight days later).—The abdomen was opened by a longitudinal incision on the right side, but the mass was now situated in the left lumbar region and found to be a hard, movable body within the stomach. A 4-in. longitudinal incision was made in the most avascular part of the anterior surface of the stomach, and a characteristic hair-cast of the organ with a prolongation into the pylorus and duodenum was removed. The stomach wall was hypertrophied. The hair-mass was $21\frac{1}{2}$ in. or 54.3 cm. in length along its greater curvature, and 11 in. or 27 cm. in its greatest circumference; the appendage withdrawn from the pylorus being 7 in. or 17 cm. in length. The weight was $3\frac{1}{2}$ lb. A few adherent strands of cotton were seen on its surface, also a hook, similar to that shown, in the interior on subsequent X-ray examination. There was a large papilloma involving the lesser curvature, which appeared to be of an innocent nature, and also several similar smaller tumours over the antrum pylori. These were removed, and the raw areas sutured. The usual surgical procedure was followed upon the completion of the operation. The patient made a full and speedy recovery, and was discharged fourteen days later.

A careful surgical technique is necessary during the removal of the hair-mass, which is frequently in a foul septic condition. Also, multiple hair-masses in the stomach and intestines have been reported in several instances; as in the case of Ledra Heazlit [4], in which two operations were performed, the first for the removal of a gastric hair-cast, and the second three days later for ileus owing to obstruction of the ileum by another hair-mass. Dr. Heazlit emphasizes the importance of this fact being borne in mind at the time of operation. In Bell's case there were eleven operations in all for the removal of hair-masses from the stomach and small intestine, with recovery.

Radiography.—The appearances are distinctive, and as this adjunct to diagnosis is now universally adopted in all obscure abdominal affections, the diagnosis of hair-mass of the stomach should now be the rule and not the exception, as formerly.

Thurstan Holland [6] has given us the first detailed description of the X-ray appearances of hair-mass, whilst Ramsbottom and Barclay [7] presented the first case which was absolutely and definitely diagnosed by radiography, and they emphasize the importance of "radioscopic palpation" in association with the screen examination. The Continental observers already named in the first section of this paper also made valuable contributions to the radiographic diagnosis of hair-ball.

Mr. Thurstan Holland has very kindly given me permission to reproduce particulars of the two cases which are of classical importance in the progress of our knowledge of the subject:—

In the first case, despite a suggestive picture, an exact diagnosis of the gastric tumour was not definitely made out, although Dr. Barclay, of Manchester, suggested hair-ball.

An exact diagnosis was definitely made out in the second case before operation. The patient was a girl, aged 16, with a history of a large abdominal tumour for ten years, which at various times had been diagnosed as a tumour of the spleen, liver, or kidneys. Operation was refused as no definite diagnosis was made. For five or six years, "up to a year ago," there had been a constant vomiting of food. This had stopped a year ago, but lately had commenced again. There was no pain, but some tenderness in the upper right abdomen. The tumour presented itself as a large, hard mass, curving down from below the left costal margin to a point below the umbilicus, and then upwards to the right, to disappear under the lower edge of the liver. The tumour was freely movable, and, when grasped by its lower part, could be swung from side to side of the abdomen as if suspended from a fixed point behind the upper left costal margin.

Mr. Holland states: "With a vivid recollection of my first case, the diagnosis appeared quite certain, and I made a definite diagnosis of hair-ball in the stomach before the X-ray examination. The history was then discussed more fully with the mother, and the fact elicited that no one had ever suggested to her any other diagnosis except that of 'tumour of the liver, spleen, or kidneys,' these were the mother's own words. I then asked a direct question: 'Are you sure that no one has ever suggested to you that the tumour consisted of hair?' The answer was significant: 'No. But now that you mention hair, I remember that when she was 4 or 5 years of age she used not only to bite off her own hair but also, in her sleep, to pick off and chew bits of blanket, &c.'"

The radiographic appearances were interesting and characteristic:—

(1) "Before any food was given, it was possible to make out the general shape of the tumour on the screen and to differentiate it from the liver, as it was thrown into relief by the gas-distended transverse colon. A plate was taken which clearly showed this." The gas-distended transverse colon partly encircled the dark shadow of the hair-mass which almost completely filled the stomach. This localizes the gastric area, and excludes the spleen and omentum, as these are outside the colonic loop. The liver can usually be distinguished from the stomach area by a faint darker outline (Matas).

(2) "The first few mouthfuls of a liquid barium meal remained held up in the cardiac end of the stomach, and spread out as if forming a cap to something inside the organ.

(3) "Shortly after swallowing a breakfast-cupful of the food the whole stomach was mapped out by what was obviously the barium lying between the walls of the stomach and the mass filling it.

"It was then obvious that an enormous mass—the hair-ball—filled the entire stomach right up to the pyloric end, the J shape being most beautifully shown."

The radiographs were taken in a standing position, with a 16-in. coil and a Sanax break. The exposure in each case was approximately half a second, an Ilford plate and an intensifying screen being used.

Diagnosis.—(1) This is now mainly one of differentiation of gastric tumour, and for all practical purposes lies between malignant disease and hair-mass. The early age, sex, long history, good health, and the particular features of the tumour are almost peculiar to hair-mass, and if suspected, and if radiographic methods be used in a routine way, then no difficulty should be experienced in the diagnosis of hair-mass of the stomach.

The free mobility of the stomach with the enclosed mass, and of the mass within the stomach as made out by "radioscopic palpation" (Barclay and Ramsbottom) during fluoroscopic examination, are characteristic of hair-mass. These observers, in their valuable report, state: "A little manipulation and rotation of the patient quickly demonstrated that the mass displacing the bismuth (showing as a lighter area in the midst of the dark shadow of the bismuth) was actually *within* the stomach. By means of palpation, it was easy to demonstrate that it was freely movable within the stomach. The tumour could be displaced, the top of it rising above the level of the bismuth food, and showing as a rounded shadow in the clear air space in the fundus of the stomach (the "Magenblase" of Clairmont and Haudek). In order to demonstrate the nature of the tumour still more clearly, the fundus of the stomach was distended with CO₂, and into the larger gastric vesicle thus obtained, the hair-ball was pushed up. It gave a heavy shadow because of the coating of bismuth it carried with it."

(2) A history of hair-eating is seldom obtained, even on inquiry, in suspected cases. This is probably due to the fact that the habit is for the most part unconscious, for when shown the hair mass afterwards, admission of the habit is usually obtained from the patient.

(3) Small masses of hair may be passed *per rectum*.

Butterworth, in his analysis of the subject in 1909 [3], collected forty-two cases; Moore, in 1914 [5], fifty-three cases; Ledra Heazlit, in 1914 [4], seventy cases; Matas, in 1914 [2], brings the number of cases to seventy-seven. The number of cases recorded to date is 108.

(4) Lavage of the stomach may bring up a few strands of hair.

(5) The presence of fatty, acid plates and needles, in the contents of the fasting stomach (Hausmann).

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Post-mortem Findings of Case of ? Neoplasm of Lung, shown at the Meeting of the Section on December 10, 1920.¹

By MAURICE CASSIDY, M.D.

THE patient remained in good health till the end of January, 1920. During the first fortnight of February he had several slight hæmoptyses, and on February 16 he was readmitted suffering from great dyspnœa and stridor. He died two days later, having been at work up to four days before his death. A post-mortem examination performed by Dr. Wordley, to whom I am indebted for a report as to findings, revealed a firm white growth which appeared to originate in the root of the left lung and had invaded the greater part of the lower lobe; the upper lobe, though free from growth, was completely collapsed, thus accounting for the upward and outward displacement of the apex beat observed clinically. The mediastinal glands were normal and no other deposits of growth could be discovered elsewhere. Histologically the appearances were those of endothelioma, though owing to much post-mortem autolysis an absolutely positive conclusion as to the nature of the growth was not possible.

Case of Congenital Aortic Atresia.

By B. T. PARSONS-SMITH, M.D.

H. K., MALE, aged 24. Complaints of shortness of breath with even slight exertion, pain in the left side of the chest, heavy beating of the heart and general lack of ability for effort of any kind; headaches frequently, giddiness, fainting sensations, general weakness of muscular power with excitement, and a functional incapacity of the lower limbs which is particularly noticeable after resting.

The past history includes the usual ailments of childhood, a tendency to bronchitis and frequent colds, but is otherwise negative. In March, 1915, when patient came up for military service, general physical incapacity became

¹ See *Proceedings*, 1921, xiv, p. 43.

manifest at the onset of training; this rapidly increased and patient was invalided in July, 1915, four months after enlistment.

In March, 1916, patient again entered the Army and in spite of recurring disabilities, pain in the chest, bronchitic attacks, shortness of breath, &c., remained at full duty for the greater part of the time until he was invalided as unfit for further service in October, 1917.

Physical Signs.—A pale-faced man of delicate appearance whose muscular development and general physique are distinctly "under par." Heart enlarged; area of cardiac dullness extends from fourth rib above, down mid-sternum, and to region of apex beat to left, which is somewhat diffuse but maximum in degree in the fifth left interspace $4\frac{1}{2}$ in. from the mid-sternal line; rhythm of heart regular; sounds clear; second aortic sound accentuated; first sound at apex reduplicated and systolic murmur audible in this region; diastole pure at apex and base; vessels slightly thickened; blood-pressure readings, systolic 144 mm., diastolic 100 mm.; no venous engorgement, jugular or visceral; spleen enlarged; no clubbing of fingers; no cyanosis; pulsation exaggerated in suprasternal notch, carotid and subclavian arteries, and definite discrepancy in pulses of upper and lower extremities, those of the latter (femoral, tibial, &c.) being diminished in size; several thick walled and tortuous vessels observed on inspection and palpation in scapular regions, presumably indicative of anastomotic circulation between arterial channels above and below seat of aortic occlusion.

The electrocardiogram shown presents several abnormalities:—

- (1) A bifid "P" wave in Lead ii.
- (2) A "T" wave whose ascending limb is unusually steep in Lead ii.
- (3) A slight increase in the length of the "P R" interval which varies from 0'18 to 0'2 sec.
- (4) A bifid "R" wave in Lead iii, the height of the second limb of the wave being conspicuously greater than that of the first.

The X-ray examination confirms the cardiac enlargement; the aortic shadow is narrow, and extends to an abnormally high level.

Diagnosis.—A case of congenital aortic atresia (adult type) in which it may be inferred that the seat of the occlusion is situated below, but in the vicinity of, the entrance of the ductus arteriosus.

Case of Osteitis Fibrosa treated by Resection of 4 in. of Humerus and Insertion of Boiled Beef-bone Graft.

By C. W. GORDON BRYAN, F.R.C.S.

A. C., GIRL, aged 10 years 9 months, was admitted to Paddington Green Children's Hospital on November 25, 1920, with a fracture of the upper part of the right humerus, due to a fall four days previously. X-rays showed a rarefied and expanded area in the upper third of the bone, about $3\frac{1}{2}$ in. long, with a pathological fracture.

In February, 1919, she had been admitted to another hospital for pain in the arm following a fall. An operation was performed, and an area of soft tissue was removed from the interior of the bone by the curette; microscopic examination showed this to consist of fibrous tissue.

On November 29 a plaster case was made in two pieces, fixing the arm in a position of abduction, flexion, and external rotation.

Operation on December 7: The bone was exposed by a 6 in. incision at the anterior margin of the deltoid; it was extensively destroyed and replaced by a mass of firm fibrous material, there being a thin shell of compact bone posteriorly, fractured in its lower part; the periosteum was absent in front for one-third of the circumference of the bone, and here the muscles formed a pseudo-capsule for the fibrous mass. After separation of periosteum, the bone was divided above and below the area of disease, 4 in. being removed; a beef-bone graft was then inserted, its lower peg extending into the medulla of the shaft of the humerus, its upper end being wedged into the cancellous bone above. This graft had been cut from the compact bone of the tibia of an ox, and was 5 in. long, $\frac{7}{8}$ in. wide, $\frac{1}{2}$ in. thick; it was shaped by an Albee's saw and by filing, and was drilled by multiple holes transversely, and also longitudinally at each extremity; after maceration it was sterilized by intermittent boiling for about forty-eight hours. The muscles and periosteum were sutured round the graft with chromic catgut, the skin closed without drainage, and the plaster case reapplied.

The bone appeared to be firmly united within three weeks of the operation: at the end of this period the plaster was removed each day and careful active movements were allowed. The patient went home, in the plaster, on January 5, 1921; at this time X-rays showed considerable formation of new bone on the inner aspect of the graft, and some small areas of formation on its outer aspect. On January 10 all passive movements were normal, and all active movements were full, except active abduction, which was slightly diminished. On January 23, the plaster was finally discarded, and since that date no apparatus has been used, the patient being encouraged to employ her limb normally. Since February 4 the condition has been as it is to-day, with firm union, no wasting, full abduction (active and passive), and full range of rotation, with slight excess of external rotation, and a similar slight degree of diminution of internal rotation. The only after-treatment has been light massage twice a week for five weeks, commencing on January 23. X-ray photographs taken on January 27, February 24, and March 24, show gradual increase of new bone, of increasing density, surrounding the graft and filling the drill-holes.

The bone removed was examined by Dr. H. Perkins, pathologist to the hospital, and it showed the typical appearances of osteitis fibrosa. The continuity of the bone shaft is lost in an irregular mass of new tissue which fills the medullary canal, and is pink in colour and of great firmness; no cysts are present. Histologically, the mass consists chiefly of firm fibrous tissue in which there are very few blood-vessels. In some parts a more cellular growth is found, consisting chiefly of spindle-shaped cells; with these are many multinucleate giant cells. The transition from spindle-shaped cells to firm fibrous tissue can be observed in the section.

It is an accepted fact that for bridging wide gaps in adult bones it is necessary to make use of autogenous bone-grafts. In children, however, the conditions are different, especially when the gap is situated near the growing end of the diaphysis, and when proliferation of subperiosteal bone cells is already present as a result of inflammation or injury; in such cases it is reasonable to expect that a dead graft will be as efficient as a living autogenous graft, for it will become rapidly united to the living bone, and be surrounded and permeated by new bone from the periosteum.

In the case which I have described the method seems to have yielded the following advantages:—

(1) It was not necessary to interfere with another of the patient's bones in order to obtain a graft.

(2) The beef graft was much stronger than any autogenous graft that could have been used, and the function of the arm was fully restored in seven weeks; from that time the limb has been used normally.

(3) The avoidance of prolonged immobilization allowed the muscles and joints to recover their functions very rapidly, and after-treatment by massage, &c., was reduced to a minimum.

Case of Cystic Tumour of the Cheek.

By PHILIP TURNER, M.S.

THE patient, a man, aged 45, a printer by trade, has a cystic swelling about the size of a walnut in the left cheek. When he was a boy and was living in India he had malaria and about seven years ago, after an injury, he had a perineal abscess and a urinary fistula; with these exceptions his health has been good. He has had the swelling for about five years. He states that he went to bed one night and on awaking the next morning he discovered the swelling was present; before this, as far as he knows, there was no swelling nor other abnormality in this situation. Since then the tumour has persisted, and does not alter in size. In 1916, while in the Army, it was thought that a carious tooth in the upper jaw might be the cause; this was extracted but the swelling has remained unaltered.

On examination the tumour appears to be a not particularly tense cyst; it is in the substance of the cheek, is not adherent to the skin or to the mucous membrane, and though it is in relation with the superior maxilla, the inferior maxilla, and the malar, it is not attached to these bones. An X-ray examination does not show anything abnormal. The tumour is situated in front of the parotid gland which is not enlarged and does not swell during meals; saliva is normally secreted; Stenson's duct is not obstructed, and the cyst cannot be emptied on pressure.

It has been suggested that the tumour may be a lipoma or a dermoid cyst but the sudden appearance, about which the patient is very certain, could scarcely be explained on either of these views. If the cheek be retracted from the alveolar process of the upper jaw a small patch of mucous membrane showing a number of dilated vessels will be seen pointing to the presence of an old naevus which has now atrophied. The cyst might, then, have developed in a naevus and may, in the first instance, have been due to a hæmorrhage which would explain its sudden appearance, and this is suggested as the most probable diagnosis.

Fibrocystic Disease of the Skull.

By GRANT MASSIE.

L. S., FEMALE, aged 21.

History.—First seen February 12, 1921. Complained of inability to see properly from her right eye, owing to increasing depression of right eyelid. Said she had had a swelling of that side of the head ever since she could remember, but that during the previous three weeks a smaller swelling had appeared, which she thought was softer than the rest. She also complained of headaches.

Admitted February 20, 1921. Wassermann reaction negative. General physical examination negative. Urine normal. No family history of syphilis.

Discharged February 28, 1921. Unwilling to undergo any surgical interference.

Seen March 29, 1921. The smaller and softer swelling for which she originally came for advice had almost disappeared.

Seen April 6, 1921. Main mass of swelling about same size, but smaller lump in middle of forehead had appeared.

Radiogram.—Mr. Redding reported: "Diffuse absorption of bone and over-growth of imperfectly defined new cancellous bone (? osteoid tissue) affecting the right frontal bone. Both horizontal and vertical plates affected. Suggests osteitis fibrosa. There is a single small cystic cavity above the internal condyle of the right femur. Otherwise lower limbs, pelvis and spine show no abnormality. The left frontal sinus is very much enlarged."

This patient was subsequently operated on by Mr. Rowlands, who found a large bony mass involving the right frontal bone and containing a large cyst which was at first thought to be the right frontal air sinus. This cyst however was found to be lined by a grey brain-like substance. The mass of bone was very large and the distinction between the bony tables was entirely lost. The dura mater was not exposed although the main mass of the tumour was removed.

Dr. Nicholson subsequently reported that on microscopic examination the mass was composed of fibrous osteitis with some bone absorption.

I am indebted to Mr. R. P. Rowlands for permission to publish this case.

Case of Parovarian Cyst in a Baby, aged 3 Months.

By W. H. OGILVIE, M.Ch.

History.—S. H., female infant, aged 3 months, had been ailing since birth, and had been treated at out-patients' department for marasmus and cough. Admitted into a medical ward at Guy's Hospital on December 14, 1920, with cough and dyspnoea. Broncho-pneumonia developed. On January 3, 1921, a lump was noticed in the abdomen, and she was transferred to a surgical ward.

I saw her next day, and found her a feeble child with a very distended and tympanitic abdomen. In the left lower quadrant was a large globular elastic swelling, dull to percussion, giving the sensation of fluid, and only slightly movable; lower border could be felt *per rectum*. Temperature 103° F., pulse over 180, very feeble; respirations 60. Patches of solid lung at both bases.

The idea of an ovarian tumour suggested itself owing to the presence of two abnormalities of the congenital type, a large rugose vulva like a cleft scrotum, and a partial stricture at the recto-anal junction. The preceding child had been born with a hare lip. However, the fixity of the mass and the distension of the intestines led me to diagnose an inflammatory exudate shut off between coils of intestine.

Operation.—Under chloroform anaesthesia the mass was felt to be spherical, and was displaced by manipulation from the hypogastric to the umbilical region, where it lay slightly to the right of the mid-line. A right paramedian incision was therefore made: consequently greatly distended coils of gut presented, and free serous fluid was found in the peritoneal cavity. A globular swelling about 4 in. in diameter was then exposed. As it could not be delivered, it was punctured with a trocar and about 12 oz. of golden-yellow

fluid evacuated. The flaccid cyst was then drawn out, its narrow pedicle clamped, divided and tied off, and the abdomen closed. The pedicle sprang from the right side of the pelvis, but owing to the precarious condition of the child and the difficulty of replacing the distended intestines, further investigation was out of the question. The operation took fifteen minutes from start to finish. The child made a slow recovery, its chest condition causing the chief anxiety, and it was discharged on February 5, 1921.

Nature of the Cyst.—Microscopical report by Dr. G. W. Nicholson: "The cyst wall itself is denuded of epithelium. As there is, however, a well developed parovarium in its wall, there can be no doubt of its nature. Parovarian cyst."

Since this report further sections have been cut from different parts of the cyst wall, but nowhere is there any ovarian tissue present.

Report on the fluid by Dr. J. H. Ryffel: "Rich in protein; no mucin. Contains some red cells and white cells, mainly polymorphs. Methæmoglobin present and a little bile pigment or hæmatoidin."

Points of Interest.—The chief interest lies in the rarity of the case. Ovarian tumours are not common in childhood, but a considerable number have been reported. The great majority have occurred in patients between the ages of 7 and 15, and among these tumours the solid growths, either dermoids or sarcomata, outnumber the cysts by about three to one. Only seven cases of ovarian cysts occurring in the first year of life are on record, and of these seven, five were derived from post-mortem reports. Successful ovariectomies were published by de Sant' Anna, of Brazil, in 1896,¹ and by D'Arcy Power in 1898.² Parovarian cysts are still more uncommon, and it is stated by Bland-Sutton that no cyst of this nature has been recorded before the age of 16.³ Certainly no case has been previously reported in a baby.

Clinically one or two points demand attention. It is hard to see how so large a cyst could have become impacted in so small an abdomen, yet this is undoubtedly what occurred. There was no twisting of the pedicle, but the cyst wall shows at one place a well defined area of pressure necrosis. This fixity may excuse the error in diagnosis. With regard to the operation, I attach importance to the closure of the abdominal wall by mass sutures. Every minute saved during laparotomy in a baby is of importance; and further, the delicate tissues have little power to deal with buried sutures, even when of an absorbable nature.

Case of Multiple Brodie's Abscesses in the Scapula.

By W. H. OGILVIE, M.Ch.

History.—S. B., a lad now aged 17, was admitted into Lambeth Infirmary in July, 1917, with a subacute osteomyelitis of one week's duration, affecting the right femur and right tibia. There was at this time also pain in the right shoulder, but the swelling only appeared later, and the joint was drained three weeks after admission for a purulent synovitis. No sequestrum was found and he recovered full range of movement.

He was admitted to Guy's Hospital on March 11, 1921, with pain in the right shoulder and a swelling in the right supraspinous fossa. A skiagram of

¹ *Gynécologie*, Par., 1896, i, p. 213.

² *Trans. Path. Soc. Lond.*, 1897-98, xlix, p. 186.

³ "Tumours, Innocent and Malignant," 6th ed., 1917, p. 622.

the right shoulder-joint taken by Mr. Magnus Redding showed three cystic cavities, one expanding the base of the coracoid process and two in the neck of the scapula. These were exposed at operation and found to contain a red jelly-like substance. They were curetted out and the cavities obliterated by removal of the superficial wall. Culture gave *Staphylococcus aureus* only. Microscopic examination of the scrapings shows a vascular type of granulation tissue.

Points of Interest.—My reasons for bringing this case here are, first, that I am fortunate in having obtained an excellent radiogram of the condition four years ago from Mr. Stebbing, of Lambeth Infirmary, the contrast between the condition of widespread periostitis then present and that of localized central abscesses shown in the second print taken three weeks ago being very striking; secondly, that the scapula is a most unusual site for a Brodie's abscess. Alexis Thomson in 1906¹ collected 161 cases of which 119 were in the tibia, the remainder being divided between the femur, humerus, radius and ulna. No cases had been reported in the scapula. There is a good deal of confusion as to what is meant by a Brodie's abscess. I should have been ashamed to acknowledge that I myself qualified without ever having heard of it, were it not that I have since been looking through the surgical text-books of that time, the 1910 to 1912 editions, and find that at that time the fact of the condition seems to have been temporarily forgotten. I find several well-known works silent about it in 1910, yet discussing it fully in the 1920 editions. Many mention central abscess of bone only as a tuberculous condition. For this revival credit must be given to the paper by Alexis Thomson referred to above. Then again some authors confine the term "Brodie's abscess" to a chronic central abscess of the tibia, while others include all abscesses of a similar pathology. Brodie's description was based on nine cases, all in the tibia, but he clearly recognizes the condition as one not limited to any particular bone. In the case of one patient he drilled a much thickened humerus, in which he expected from the symptoms to find just such an abscess. No abscess was present but the pain was relieved by the operation. It is surely better, if the term "Brodie's abscess" is to be retained, to include under this heading all chronic abscesses of bone due to septic origin, in whatever bone they may occur. One point brought out by Alexis Thomson is very well illustrated by the case I show this evening, namely, that Brodie's abscess in bone is liable to follow mild attacks of infection rather than those attacks in which an acute process has gone to sequestrum formation. In this boy the process was acute in the tibia and femur, and these bones now show periosteal thickening only, but no central abscesses. In the scapula a milder type of infection has resulted in the persistence of still living cocci in the interior of the bone, and the appearance of central abscesses four years later.

[Two radiograms were shown, the one giving the condition of the scapula four years ago, the other that on admission to Guy's Hospital.]

Case of Abdominal Tumour.

By A. W. SHEEN, C.B.E., M.S., F.R.C.S.

C. G. C., AGED 26, shop assistant. Malaria, sandfly fever and dysentery during War. In August, 1920, when before a Medical Board for malaria, complained of pain which had recently developed below his left ribs and says

¹ *Edinb. Med. Journ.*, N.S., xix, pp. 297-309.

the doctors found a "lump" there and recommended his going into hospital. Pain became worse, coming on particularly after exertion. He was admitted to Orpington Hospital on March 18, 1921. He did his work up to the day he came in. Has become slightly thinner.

March 23, 1921: Seen by me. A thin, apparently healthy man. There is an abdominal tumour in the left umbilical region, the size of an orange, reaching to the mid-line and having its lower border at the transverse umbilical level. It is smooth, firm, slightly movable and has a communicated aortic pulsation. Slightly tender on pressure. Intermittent pain in its region, worse after exertion. Spleen not enlarged. Other signs and symptoms negative. Barium meal shows a normal alimentary tract except that there is a bulge at the left end of the greater curvature, not in the situation of the tumour, which Mr. Russell Reynolds—who has kindly examined the skiagrams—thinks is unusual and not due to a peristaltic wave. The skiagrams are shown.

April 5: Seen again. It is difficult to make out the tumour clearly. There is only an indefinite, tender fullness.

There are numerous diagnoses which may be made in this case. Those which appear to me most probable are: Misplaced kidney; tumour of stomach; cyst of tail of pancreas. Opinions are invited. I propose to operate on the patient and hope to report the result at a later meeting of the Section.

Note.—At the meeting the tumour was again quite distinct as when first seen.¹

Enlarged Spleen: Case for Diagnosis.

By BERNARD MYERS, C.M.G., M.D.

G. H., FEMALE, aged 13, came to the out-patient department, Royal Waterloo Hospital, on February 7, 1921, complaining of swelling of the stomach.

Upon examination, she was found to be only moderately-developed; height was 4 ft. $\frac{3}{4}$ in. (a few inches shorter than normal); weight 4 st. 2 lb. 8 oz. Bowels were opened daily; appetite fair. Mentally, appeared up to general standard of her age. Distinct yellow tinge of the skin and conjunctiva present. As far as the history can be ascertained, this seems to have existed since the age of 7. Her father states that it becomes a little worse when she catches cold. Telangiectases noted on cheeks and forehead. The abdomen distinctly enlarged, but exhibited no enlarged veins nor telangiectases. Spleen and liver increased in size, spleen extending to 1 in. below umbilicus, its right border passing just beyond middle line of body. Liver moderately firm to touch, and not painful, extending from fourth rib in right nipple line to quite three fingers' breadth below costal margin. Seemed to be rather hard, and what felt like little nodules were palpable on anterior surface and lower border. One small area in nipple line a little tender to touch. No fluid could be found in abdominal cavity. Apex beat in fourth left nipple line. Reduplicated first sound heard at apex. Very slight impairment at apex of right lung; breath sounds harsher than normal, expiration and vocal resonance increased. Some moist sounds audible in this area and in most of right front. Urine, specific gravity of 1025, acid; no albumin nor sugar. Colour yellow; no definite colour could be seen in froth. Distinct trace of bile present with the

¹ Operation showed the tumour to be a misplaced kidney of normal size and shape. The right kidney was apparently normal.

iodine test. Subsequent examinations always gave same result. No other appearances of importance detected in urine. Tongue showed fissures; no fissures on lips and no bone changes.

Mr. Biggs reported ears, nose and mouth normal, and Dr. Bickerton found right vision $\frac{2}{3}$, left vision $\frac{2}{3}$, and disks and fundi normal, but vessels rather congested. A few lymphatic glands could be felt in neck, and a doubtful one above right internal condyle of right humerus. No history of similar case in family. Patient had, apparently, no symptoms until age of 7. Since that time she has never been quite well, and has suffered from slight epistaxis. She has not had nausea, vomiting or hæmatemesis during her illness.

Admitted to the wards for observation. Blood-examination showed: Red blood corpuscles, 3,460,000 per cubic millimetre; hæmoglobin, 68 per cent.; colour index, 1; white blood corpuscles, 5,400 per cubic millimetre (the white cells were previously 7,800). Differential count: Polymorphs, 60 per cent. (3,240 per cubic millimetre); lymphocytes, 22 per cent. (1,188 per cubic millimetre); eosinophils, 10 per cent. (540 per cubic millimetre); basophils, 2 per cent. (108 per cubic millimetre); large mononuclears, 6 per cent. (324 per cubic millimetre); anisocytosis, poikilocytosis, and polychromatophilia, absent. No abnormal red or white corpuscles seen.

Remarks.—Banti's disease seemed to be negated by the absence of hæmatemesis and ascites, and by the leucocyte count. The leukæmias were excluded by the blood examination and the history. The case seemed possibly to be one of acholuric jaundice of the Hayem type. The fæces are normally coloured, the urine contains a distinct trace of bile, and Dr. Jockes reported initial hæmolysis between 0.45 and 0.5 per cent. saline, and total hæmolysis by naked eye, at 0.275 per cent. solution, and, by microscope, at 0.2 per cent. One had, therefore, to look elsewhere for a diagnosis. The case was not like a tuberculous process, and either Hanot's cirrhosis or syphilis had to be considered. The history is, in some ways, like Hanot's cirrhosis, but not altogether, nor is the liver typical of that complaint. The first Wassermann test performed directly after she came into hospital, was negative; a second, by another pathologist and two weeks later, was doubly positive, and a third, by a different pathologist, again, was negative. It was decided, however, to give glucose galyl 0.02 gm. intramuscularly every fortnight, also intramuscular injection of a half-grain of Hg. in cream form, and Hydr. c. creta 1 gr. t.d.s.; pot. iodi 4 gr., were administered t.d.s. at the same time. After a month's treatment, the spleen has become a little softer, and slightly, but quite distinctly, decreased in size. The liver is now one finger breadth less than formerly. The icteric tinge has certainly diminished a little, and she states that she feels generally better than she has done for some years. Her temperature has been practically normal throughout, her pulse about 100, and respiration 25. On April 5 she was given 250 c.c. of blood by the citrate indirect transfusion method, for the purpose of observing the effect on her anæmia. Although the case is being treated as not improbably syphilitic, it is brought before this Section as a case for diagnosis.

Case of Operation on Brachial Plexus.

By B. S. SIMMONDS, M.S., F.R.C.S.

R. E. I., AGED 22, No. 21 Hut, Queen Mary's Convalescent Camp, Woodcote Park, Epsom, Surrey. Gunshot wound left shoulder and chest (bullet). Fracture of clavicle and first rib. Lesion of brachial plexus. Lesion

of axillary artery and vein. Hæmothorax. Wounded October 24, 1918. Healed March 8, 1919.

On examination, May 3, 1919: Complete lesion of brachial plexus.

Operation, June 13, 1919: Plexus explored by division of clavicle and pectorals. C. 5, 6, 7, 8, and D. 1 roots found to enter dense mass of scar, from which cords of plexus emerged. Faradic stimulation of roots gave no results; scar tissue, including plexus, excised. Nerves sutured as follows: C. 5, to posterior cord; C. 6, to outer cord; C. 7, to inner cord. Clavicle and pectorals sutured.

Last seen, October, 1920. Then had weak voluntary contraction in biceps. Weaker voluntary contraction in deltoid. Faradic response in all muscles. Regenerating sensation.

Examination, January 7, 1921: Voluntary contraction in deltoid, biceps, triceps, supinator longus, extensor carpi radialis longior, extensor carpi radialis brevior.

Case of Tendon Transplantation.

By B. S. SIMMONDS, M.S., F.R.C.S.

A. C. A. N. GUNSHOT wound right arm. Fracture of humerus. Lesion of musculo-spiral nerve. Occupation, clerk. Wounded, February 21, 1913. Healed, June, 1918. Broke down twice after.

Operation, January 27, 1919: Musculo-spiral nerve explored; 4 in. gap; impossible to bring ends together.

Operation for tendon transplantation, May 29, 1919: Pronator radii teres into extensor carpi radialis longior and brevior. Palmaris longus into extensor ossis metacarpi and primi internodii pollicis. Flexor carpi radialis into extensor communis digitorum. Flexor carpi ulnaris into extensor secundi internodii pollicis and extensor indicis.

After-treatment: Splint with wrist, thumb and fingers in hyper-extension, and re-education of muscles.

Case of Gastro-jejunal Ulcer.

By R. P. ROWLANDS, M.S.

MR. W. Four years ago patient had had a duodenal ulcer and posterior gastro-jejunostomy had been performed. Six months ago symptoms recurred with much hyperchlorhydria. He was operated on four weeks ago and an anterior gastro-jejunal ulcer found almost perforating the colon. This was excised and the stoma enlarged. Patient doing well.

Case of Jejunal Ulcer.

By R. P. ROWLANDS, M.S.

MR. S. Patient had had his appendix removed previously and at the operation everything else was found to be normal. Two years later he developed a duodenal ulcer, and a posterior gastro-jejunostomy was performed for the relief of this. Six years later his symptoms began to recur. There was much hyperchlorhydria. He was operated on at the beginning of March. A posterior jejunal ulcer was found invading the pancreas. This was excised and the stoma enlarged. The symptoms were relieved.

Clinical Section.

President—Sir ANTHONY BOWLBY, K.C.B., K.C.M.G., K.C.V.O.

(Joint Meeting with the Sections of Medicine and Surgery.)

DISCUSSION ON THE MEDICAL AND SURGICAL TREATMENT OF GRAVES' DISEASE.¹

Dr. HECTOR MACKENZIE

said that in opening this discussion on the medical and surgical treatment of exophthalmic goitre he need say little about purely medical treatment, not because he considered it of less than first importance but because he thought there was a general agreement among physicians on the subject. No one questioned the value of rest to body and mind, of tranquillity and freedom from worry and excitement, of fresh air and bright and cheerful surroundings, of a judicious and well-regulated dietary, and of good nursing. All would admit that while they possessed many valuable drugs and remedies they had as yet found nothing which could claim to be a specific for the disease. They were all alive to the fact that there might be present other conditions contributory to ill-health, independent of the disease itself, and that these might need adequate and independent treatment, such as septic tonsils, pyorrhœa and alimentary toxæmia. They saw that many of the slighter and some even of the really severe cases of the disease responded to medical treatment and got well after a time. They held that every case should first have a fair trial of medical treatment. But they were bound to admit that some cases, in spite of all their endeavours, did not improve or get worse, that some remained ill for a long time or never lost all symptoms of the malady, and that a certain proportion, variously estimated, died sooner or later as a result of the disease. This was an unsatisfactory state of things, and in common justice to their patients they had seriously to consider whether treatment by other than strictly medical methods could achieve better results. There were two modes of treatment other than medical, the claims of which could not be ignored by the physician, namely, treatment by X-rays and treatment by operation.

The discussion which had taken place at this Society nearly ten years ago² showed that there was then much difference of opinion among physicians and surgeons as to the value and expediency of surgical treatment. Since then surgery had made great advances, the views of some of them had changed, and the time was ripe for a reconsideration of the subject. Ten years ago he had been in agreement with surgical treatment in theory, but his experience of it had been so unfavourable that he was then strongly opposed to it in practice. In 1908 he had written "if we could be certain that the essential and fundamental cause of the disease is the hypertrophy and over-activity of the thyroid gland the most rational method of treatment would

¹ At a joint meeting of the above Sections, held February 11, 1921.

² *Proceedings*, 1912, v (Sect. Surg.), pp. 61-130.

obviously be to reduce the enlarged gland to something like normal proportions by surgical means." The risk to life from the operation however at that time had seemed to him an insuperable objection.

At the former discussion a paper had been presented by Mr. James Berry, contributed by Mr. T. P. Dunhill, of Melbourne, who reported a series of cases operated on under local anaesthesia. The results were most satisfactory, and if he remembered rightly no life had been lost. At that time he had had no personal experience of cases operated on under local anaesthesia, and he had found it difficult to reconcile Mr. Dunhill's record with his own observations of surgical treatment. He had asked himself, could the cases operated on be of a different type from those he had seen operated on here?

In 1915 he had first met Mr. Dunhill, who had come over with the Australian Expeditionary Force. At that time he (Dr. Mackenzie) had as a patient, a girl, aged 19, suffering from a very pronounced form of exophthalmic goitre, which he had been treating for eighteen months without any real improvement. She had a large goitre, bulging eyes, a palpitating heart, and the other usual symptoms. She had been ill for three and a half years, and she had asked him almost in despair: "Can't you do anything more for me?" Mr. Dunhill had appeared as the *deus ex machina*. He happened to be in the next room, and he (Dr. Mackenzie) had asked him to see her. It had not seemed to be a very hopeful case, but Mr. Dunhill agreed to operate under local anaesthesia and a right hemithyroidectomy had been performed. The result had been very satisfactory, and that case had led the way to others. Dr. Mackenzie had only been able to have Mr. Dunhill's help at intervals, on account of his duties in France, but he had kindly initiated the late Mr. Stewart Rouquette and after him Mr. Romanis, both of St. Thomas's Hospital, into his technique, and in that way Dr. Mackenzie had been able to obtain surgical treatment for all those cases in which he had thought it was indicated.

He had now acquired a comparatively wide knowledge of the results of surgical treatment, with which he had every reason to be satisfied. No attempt had been made to select slight or early cases. The leading principles of selection for operation had been (a) that the disease had lasted some time; (b) that a fair trial had been given to medical treatment; and (c) that no real improvement had been brought about. Of thirty private cases operated on, the average duration of symptoms before operation had been four years. The mortality had been very small—under 2 per cent. on private and hospital cases combined. In some of the cases operation had been performed almost as a forlorn hope, and any surgeon out for statistics would have declined to touch them. The after-results of the operation had been most gratifying. No patient regretted having undergone the operation. Some cases had required more than one operation. The first case of the series had required three operations. At the first operation, in December, 1915, the right lobe only had been removed. This had been followed by much improvement in the general health, but the heart's action, although somewhat slower, had remained too quick. It was not until March, 1917, that Mr. Dunhill had been available to perform a second operation, which had consisted in removing the greater part of the left lobe, leaving the upper pole. Further improvement had followed the second operation. The whole appearance had improved. The patient had been able to walk much farther without fatigue, and the tremor and restlessness had disappeared. The pulse however was still too quick, and the eyes had remained as prominent as at first. They had concluded that the

patient had still too much thyroid, and a third operation was performed in February, 1918, under general anaesthesia with open ether. The remainder of the left lobe had been found to be about the size of a large plum, and two-thirds of this were removed. The result after the third operation had been entirely satisfactory. The heart had at last quieted down to a normal rate. Although the eyes were still remaining prominent, all the staring, frightened look had gone. The degree of improvement obtained might be gathered from the fact that a few months after the third operation the patient had gained two first prizes for pianoforte playing, and exhibited no nervousness in playing in public. It might be noted that while previously she was always too hot she had now began to feel the cold, and found the need of warm clothes and hot bottles in bed. The improvement thus gained had continued, and the patient was among those who were there to-night to show the results of operation. This was the only case of his which had required three operations.

The usual results obtained by partial thyroidectomy were (1) that the patient became tranquil and ceased to be restless; (2) there was a gain in strength and endurance; and (3) the heart's action became slower and steadier, although this might only come about gradually. Exophthalmos was the most persistent symptom, and the eyes might remain prominent, but the staring, frightened look usually disappeared. In cases in which only one lobe had been removed the improvement which was produced was usually not so great as in those cases in which a smaller amount of the gland had been left behind, and a second or even a third operation might be needed, as had just been mentioned, to obtain the best results. But the improvement which followed the removal of one lobe only was sufficient to justify the operation, and the future prospects of the patient were much better than they would have been without its performance. It should be noted also that when one lobe had been removed the second operation might be performed with safety under light general anaesthesia.

Were there any contra-indications to operation? (1) He did not think it was advisable to operate when there was fear or dread of the operation. It was always important that the surgeon should gain the confidence of the patient. They had had one case at St. Thomas's Hospital in which after the patient had been prepared for operation and after local anaesthesia the skin incision had been made, an air raid took place. The operation was suspended, but the patient was thoroughly unnerved, the pulse went up to 200, and death ensued from fright. (2) He thought as a rule it was inadvisable to operate when mental symptoms were present, but he had ventured to have one patient operated on in whom nocturnal delusions had been present, and after operation these had disappeared. (3) The association of diabetes with Graves' disease made operation inadvisable. (4) The presence of auricular fibrillation made one hesitate to advise operation, but on occasion risks had to be taken, and he had sometimes felt that the risk was worth taking. He had had several cases operated on in which this symptom had been present, and the result had been that the heart had subsequently become quiet and regular.

He would specially emphasize that under local anaesthesia and with a skilful and expert surgeon the operation of partial thyroidectomy could be performed with comparatively small risk. They had to set against this small risk the danger which the patient ran of dying from the disease or of remaining in a condition of chronic ill-health.

At the present time there were some who were altogether opposed to the

surgical treatment of exophthalmic goitre as he himself had been at one time. They had exaggerated ideas of the danger of operation; they probably had not seen the benefits which operation might bring about and possibly they expected more from medical treatment than was warranted by experience. On the other hand some might think that medical treatment was useless and that surgical treatment should be carried out without delay in every case. Both, it appeared, were wrong. The patient should always first have a fair trial of medical treatment, but if there was no obvious improvement after a reasonable time surgical treatment should be carefully considered and the patient should be given a chance of restoration to health by this means. Perhaps before very long they would be more successful in curing by medical means alone. But at the present he knew of no other treatment which offered so good a prospect of restoring to health and vigour those patients who had failed to recover under ordinary medical care.

In conclusion, he would briefly summarize his views about X-ray treatment of exophthalmic goitre. The effects of X-rays in reducing the splenic enlargement of leukæmia had long ago suggested to him the possibility of attaining a similar result in the case of the thyroid enlargement of Graves' disease. It was not however until after he had been trying this method of treatment for a number of years that in 1915 he met with any convincing instance of its efficiency. The case was that of a young woman who had been in his ward some three years before suffering from exophthalmic goitre in a typical form, subsequently to which she had a long course of X-ray treatment. She had lost all signs of Graves' disease and instead presented early signs of myxœdema which soon disappeared under thyroid treatment. This case had encouraged him to persevere with X-ray treatment in other cases more energetically than he had done before, but he had not had another case which he could consider cured and on the whole he regarded the results as disappointing. It had to be borne in mind that X-ray treatment might be followed by local scarring. He had seen one case in which, although a cure of Graves' disease was effected by X-rays, a troublesome keloid had developed three years later over the exposed area. The conclusions to which he had come from his own observations were that it was rare for a cure to be effected; in some cases improvement might be brought about with prolonged treatment while in others there was no obvious benefit. The cure which might be effected supported the truth of the theory that the essential nature of exophthalmic goitre was hyperthyroidism. The drawbacks to the treatment consisted in the long time it took, the difficulty of carrying it out in cases of a severe type and the not altogether negligible risk of X-ray burn.

MR. JAMES BERRY

in opening the discussion from the surgical side said that the subject of the surgical treatment of exophthalmic goitre was both important and difficult and that the statements he would make would only represent the expression of opinion of an individual, based in the main upon personal experience. Time would allow him to do little more than touch lightly upon the main points at issue. In 1914, in the *British Journal of Surgery*, he had gone very fully into the whole subject and since then his views had undergone but comparatively little change. A wider experience, however, had led him to take, on the whole, a somewhat less sanguine view of the advantages

of operation than he did then, mainly on the ground of the tendency to relapse after even the most successful operation, and the incompleteness of the cure in many cases that at first sight seemed most favourable. He was glad to see there to-day many surgeons of large experience in this branch of surgery, who would doubtless tell their own personal experiences and he dared say differ from him in many of his conclusions. He was especially glad to see here his friend, Mr. Dunhill, who had recently forsaken the Antipodes and come to place his talents at the service of this country.

He would begin by making two statements that would not, he thought, be controverted by anyone who had had large experience of these operations:—

(1) That the usual result of an operation for exophthalmic goitre was that, within a very short space of time, generally within a few days, the patient felt that she had derived *immense benefit* from the operation. The feeling of illness, of wretchedness, of depression, quickly disappeared. The tachycardia often diminished very greatly, and might disappear completely in a few weeks. Exophthalmos was often lessened, although complete disappearance was much less common. The amount of benefit depended largely, but by no means wholly, upon the amount of gland that had been removed.

(2) The operation of removal of an exophthalmic goitre, even when skilfully performed, and carried out under the best conditions, involved *considerable danger to life*, a danger which was far greater than that of operations for simple goitre. The mortality of these latter operations had now been reduced by most surgeons, familiar with thyroid surgery, to a mere fraction of 1 per cent.—due to complications and accidents.

The operation of removal of true exophthalmic goitre generally involved a mortality of at least 3 to 5 per cent., and it was well known that many series of such operations, although mostly unpublished, gave a far higher mortality than this. Too much stress, however, must not be laid upon mere mortality. The disease was undoubtedly a very serious one and a mortality of even 5 per cent. was one that most patients suffering severely from the disease would willingly undergo, if the operation offered a good chance of complete and permanent cure.

He was now speaking only of *true* exophthalmic goitre, and he did not include those numerous cases of simple goitre accompanied, as they often were, by palpitation, tremor, &c. Such cases did not develop exophthalmos and their inclusion in statistics of exophthalmic goitre was wholly misleading. They did not show the characteristic pathological changes in the thyroid gland and the mortality of operations upon them was little, if at all, higher than it was in simple goitre.

He now suggested for discussion—

- (1) *What surgical treatment should be adopted for exophthalmic goitre?*
- (2) *What operation should be performed?*
- (3) *How it should be performed?*
- (4) *How they should treat the patient afterwards;*
- (5) *The question of relapse.*

(1) Of the numerous operations open to them, he would confine himself to the only two that in his opinion, had any real value—namely, removal of a portion of the thyroid gland, and ligation of thyroid arteries, the only two that he himself performed.

Operations upon the sympathetic, exothyropey, injections of boiling water and other substances into the gland he did not think worth discussing.

The operation of removal of the thymus gland, which was always enlarged in cases of true exophthalmic goitre, was an operation much praised by some. It might be that it was valuable, but he had no personal experience of it and did not think sufficient proof of its value had yet been adduced. He hoped they would hear the opinions and experience of others on this subject. It was often very difficult or impossible to perform, and owing to the intimate relations of this gland to the innominate vein and pericardium the removal of any considerable portion of it must involve considerable danger.

Ligation of the inferior thyroid artery he had completely abandoned, as it was a difficult operation, scarcely inferior in difficulty and danger to removal of a lobe, which was far more likely to cure the disease.

Ligation of the superior thyroid had the very great advantage of being a comparatively easy, short and, on the whole, a very safe operation. He had not lost a case for more than eight years, and during that time he had performed a large number of these operations.

LIGATION OF SUPERIOR THYROID ARTERY FOR EXOPHTHALMIC GOITRE, 1913-19 INCLUSIVE.

Hospital Cases Only.

Patients: male, 1; females, 27	...	...	...	Total	28
Operations { Bilateral simultaneous	...	...	5 patients = 10 arteries		
Bilateral at different times	...	...	14 " = 28		
Unilateral	...	...	9 " = 9		
			28*	47 = 42 operations.	

No deaths in any of these cases or in any of the private cases during this period.

* Nine of these patients subsequently underwent extirpation of one lobe.

In itself, the operation often did much to improve the patient's condition and afforded the surgeon valuable means of judging whether he could, if necessary, proceed subsequently to the larger operation of thyroidectomy. It was most suitable for cases of large exophthalmic goitres in patients who were either acutely ill or suffering severely from visceral complications. But it could not be done with impunity in every case. The main question of interest, with regard to removal of the gland, was how much should be removed? Here he had almost abandoned the practice of operating simultaneously upon both lobes, as in most cases he thought this involved too much risk to life. Nor did he now usually remove even the whole of one lobe. He always left a small portion at the hilus and he liked to leave a good deal of the posterior capsule. Among other reasons, damage to the recurrent laryngeal nerve was much more likely to occur if the whole of the posterior capsule were removed. Enucleation or "shelling out" operations should of course never be attempted in any case of true exophthalmic goitre, except in those very rare cases in which true Graves' disease was superadded to an old encapsuled cystic or solid adenoma. These cases were quite distinct from those of the so-called "toxic" adenoma, or false Graves' disease as he preferred to call it, in which they could do practically what they liked, without much more danger than that of any ordinary goitre operation.

(2) *When Operation should be performed.*—There were, he believed, some surgeons who operated upon nearly every case, independent of the stage which the disease had reached and of the complications, especially cardiac, which might exist. Although he believed this to be a mistake, it would be interesting to learn what results, immediate and remote, followed such a practice. He considered that it was wrong to do thyroidectomy when the patient was

suffering from very acute mental excitement or when the visceral complications, especially myocardial degeneration, were very marked. But sometimes a mere ligation was permissible under conditions which would preclude the performance of the larger operation. In Graves' disease there were generally periods of remission during which operation might be undertaken with much greater safety than at other times. It was just during the period of exacerbation when the patient, and often the general practitioner, and sometimes the physician, was most anxious for operation; and when the surgeon should resist the temptation to operate at a time when his better judgment should tell him that this ought not be done.

He would also add that operation should never be performed until the patient had been resting quietly in hospital or nursing home for at least a few days and had become accustomed to the new surroundings. On the other hand he did not operate at any stage upon patients who were steadily and continuously improving and especially upon patients—and there were many such—who did not feel at all ill. Operations under such conditions seemed unnecessary.

He never tried to persuade a patient to be operated upon against her own wish. The converse was very much more likely to occur, since he felt that most really bad cases of exophthalmic goitre were only too willing to submit to any operation that afforded a prospect of cure. He never tried to "steal the gland" by not telling the patient when the operation was to be done. On the contrary he thought it much better to gain the patient's confidence by talking to her freely and telling her frankly of the discomfort that she must expect to undergo and that she would probably feel very ill for a day or two. By doing so, a patient was much less likely to be frightened and excitable after the operation, at a time when it was important that she should keep quiet.

(3) *How the Operation should be done.*—The ordinary rules for removal of a goitre should be followed, the greatest possible care being taken with hæmostasis and, of course, with asepsis. No kind of antiseptic should ever be put into the wound.

The question of anaesthesia was a very important one. He was coming more and more to believe that a very light open ether anaesthesia was preferable for most cases, although undoubtedly there were some in which local anaesthesia was preferable, if the patient had sufficient resolution to stand what was undoubtedly a very disagreeable performance. There were some surgeons he knew, and more physicians he thought, who supposed that the use of a local anaesthesia was the main factor of safety in the operation. But it was by no means the only factor, and was not even, in his opinion, the main one.

The method of operating varied a good deal according to the shape and size of the goitre, and especially as regarded the size of the isthmus. The rigidity and solidity of the goitre and the pressure of a thick isthmus often made the operation extremely difficult, especially the stage of ligation, in its continuity, of the inferior thyroid artery. This was an important step in the operation, which was nevertheless sometimes impossible to execute. It was here that the aid of a really skilled assistant was most valuable, as he could sometimes with one finger control temporarily the circulation through this artery when it could not be reached for ligation.

His opinion was, that except in some cases of acute intoxication and of myocardial degeneration, sheer hæmorrhage was usually the main cause of death after removal of an exophthalmic goitre as ordinarily performed. Even a comparatively small amount of hæmorrhage, which would be of little or no

importance in a case of ordinary goitre, might easily prove fatal in exophthalmic goitre.

On the very important question of the heart and its relation to these operations, he naturally said nothing, as Dr. Strickland Goodall, who was present, and had examined a large number of his patients before and after operation, would deal fully with this subject.

(4) The *after-treatment* might be summed up briefly in the single word "water." The patient must be encouraged to drink large quantities (many pints) of water, or if a general anæsthetic had been employed, large quantities of saline solution must be introduced by the continuous drop method, care being taken that the rectum was never distended. In practice both methods were usually adopted simultaneously. In one rather exceptional case of his, that recovered, as much as 18 pints of fluid were absorbed in the first twenty-four hours. But the absorption of 8 to 10 pints in this period was not unusual. It was here that the services of a skilled nurse trained in the after-treatment of these cases was most valuable. Drugs were of little value in the after-treatment, so far as he was aware.

(5) Finally, he came to the important question of *relapse*. No doubt a good many patients, who had made good recoveries from the operation, and had remained well, or practically well, for considerable periods of time, were liable to relapse, and they might even die of the disease. In some of these cases a second operation was advisable, more gland being removed. But there is a limit to the amount of gland that can be removed, lest the ultimate condition of the patient, although different, may be as bad as, or even worse than, the first.

Some of the operations, the results of which were recorded in the table before them, were second operations, a primary operation having previously been performed either by himself or by other surgeons.

[A table of the ultimate results of seventy-nine operations (upon seventy-eight patients) for removal of true exophthalmic goitre (excluding mere ligations) during the seven years 1913-19, was shown: fifty-three of the patients were practically well; eighteen were much improved; three were but little, or not at all, improved; one was worse and three died as the result of the operation. Several patients who had undergone operation were exhibited together with photographs and pathological specimens. The following is the case-record of one of the patients shown.]

Severe Case of true Exophthalmic Goitre, practically Cured by Removal of the Right Lobe of the Thyroid Gland nearly Eight Years ago.—T. M., aged 55. History: Rather sudden onset about eight months before operation. Vomiting, giddiness, tremor, exophthalmos and emaciation. Continuous medical treatment as in-patient in two general hospitals in London and at a convalescent home until May 5, 1913. Removal of right lobe after three weeks in bed. Typical exophthalmic goitre with scarcely any colloid. Within a fortnight began to improve, two months later returned to business; six months later had a slight relapse, but by this time he had gained 24 lb. in weight. He has been able to carry on his business ever since, and for seven years has done all the work of his small garden, digging, &c. He still has a little exophthalmos, but is otherwise in good health.

Photographs, before and after operation, were shown on the screens.

Mr. T. P. DUNHILL, C.M.G.,

said that he had decided to speak on three aspects of the question that afternoon:—

(1) The grounds on which he considered some intervention other than purely medical to be necessary in some cases.

(2) What degree of improvement could be obtained by surgical methods.

(3) What permanence one might expect in this improvement.

The first question—whether there was any necessity to consider surgical intervention? Sir William Hale-White had stated that fifteen patients who came into hospital and died, could be excluded from the discussion, because they were so bad that operation would not enter into the question. Mr. Dunhill submitted that they were of great importance to the discussion. Mr. Walter Edmunds had stated that, of thirteen cases whom he had observed, treated medically, two died. He (Mr. Dunhill) had reported before, that in one year six cases under his own observation came to hospital and died (without operation); and in the last four months in London two similar cases had occurred. The fact that these people died in early, or early middle life, led him to wonder whether anything more could not have been done to save their lives.

Death was not the only tragedy in Graves' disease. The late Mr. Jessop had collected twenty-five cases of Graves' disease in which an eye had been lost, due to ulceration occurring through the extreme proptosis. Mr. Dunhill had had two cases in which an eye had been lost, and another in which haziness of the cornea had resulted. He had seen auricular fibrillation in many cases, and had known it develop in at least three cases while they were under medical supervision. He had also known many cases with generalized oedema.

While cases in these stages, and in every stage leading up to them, could be seen constantly occurring in the departments of hospitals, and in private practice, it seemed to him that treatment other than medical must at least be considered, though he did not for one moment say that all cases should be operated upon. They all recognized that some cases recovered. When they had discovered which cases recovered, and why they recovered, they would have learnt much. They did not know the factors which enabled some individuals to recover an equilibrium—a glandular and nervous balance. No single drug would do it. Drugs would ameliorate some symptoms, equally so might rest, and freedom from strain and worry, or the removal of any additional load which the patient might be carrying. Therefore the removal of a focus of septic absorption might have the same effect. It would not cure the disease, but it might allow nature to re-establish a balance. Therefore the idea of operation was not to be entertained until (1) removal of every toxic focus, (2) rest, and (3) symptomatic drug treatment had been given efficient trial. No time limit could be put to this. While there was definite improvement which could be shown on a chart this treatment should be persevered with, but when improvement ceased, or if no improvement occurred, other measures must be considered without delay. These other measures were X-ray treatment and operation.

His personal experiences of X-ray treatment had been unsatisfactory. Patients felt better while they were under treatment, but the pulse-rate had not come down, the size of the gland had not been reduced, the exophthalmos had not been altered, nor had the tremors disappeared. The great majority

of cases he saw were late and well established—very late, some of them, and these cases were admitted to be more resistant.

A good many theoretical objections had been raised against operation: there was one theoretical objection against X-rays. Dr. Murray stated that pathological examination of glandular tissue removed after X-ray treatment, had shown well marked fibroses in the gland surrounding the alveoli, and around the gland. Could it be told when or where this fibrosis would stop? It continued long after the application of the rays. This might be more likely to induce myxœdema through cell atrophy than clean removal of excess of gland tissue. He simply raised the question. He had had many advanced cases sent to him after X-ray treatment, and the cases which he had sent for X-ray treatment—certainly all well-established cases—he had been compelled to operate upon subsequently.

What was the outlook if patients were not improving? Was it sufficient for them as a profession if the patients just did not die? It was said that the course of this disease ended in (1) recovery, (2) myxœdema, (3) death, but this was not a correct statement of the case.

Some recovered. Statistics collected by Sir William Hale-White would lead them to believe that few above the normal proportion died; and he (Mr. Dunhill) knew that very few reached the stage of myxœdema. Where were the others? There were numbers who were in various grades of ill-health down to the most complete bed-ridden wrecks. Some could do light work, some could keep going if they rested much and limited their activities. Some were very ill, but unable to rest, for a spirit of restlessness possessed them; and some were waterlogged from cardiac and renal incompetence. In some an eye was irretrievably damaged. These conditions were far more common than myxœdema: and they were not passing phases. In each of these grades there were those in whom improvement, if it occurred, took years to effect, and those who would never improve. In most of these, long periods of their lives had been spent in striving to get on to a higher plane of health, while gradually slipping down on to a lower. Wilfred Trotter had stated there nine years ago that "we were justified in undertaking some risk to free these patients from the miserable existence they led."

He hoped to show evidence that there was none of these cases which might not be tremendously improved by operation. And of the cases which Dr. Hector Mackenzie had asked him to see and operate upon during his "leaves" from France, throughout the war, there was not one patient who was not so improved as to approach a cure; and although some of these were extremely ill, none died.

The second question was the amount of relief which might be expected. He would show photographs of two who had been vomiting for a long time. Each had been in hospital for many weeks before he was asked to see them. They had lost ground progressively. The vomiting could not be arrested, and they could not well have been worse. The pulse chart of one of them had been scarcely countable. All the signs and symptoms had been present. Each had been operated upon under local anæsthesia, and each had had a second operation. Dr. Pasteur had seen one of them through her worst period before operation in France, and vouched for her condition. The other patient was now doing her household duties. The recovery had begun at once, after the first operation. But it would have been incomplete if part of the second lobe had not been removed, in fact the condition of the patient would probably have become as bad as it was before.

Cases like these showed some definite facts. The patients were extremely ill; they were getting worse; the downward course could not have been stopped by anything short of surgical measures. It had been stopped at once when a lobe was removed. The improvement had been completed by removing the optimum amount of gland tissue; and one of the patients was there to be seen, nearly four years afterwards, with palpitation, tremors, and exophthalmos gone.

In reference to exophthalmos which it was stated rarely disappeared, it might be said that there was exophthalmos remaining in one of those shown that afternoon. One of her eyes had receded greatly, and the lid came well over the iris. The other one had not receded so much; the description of this case as recorded by Dr. Mackenzie in the Bradshaw Lecture, November, 1916,¹ should be taken into consideration. The four others whom they had seen had proptosis and they had seen that it had so nearly gone as to be scarcely noticeable. Exophthalmos would generally disappear if cases were sent for operation within a reasonable time and if sufficient gland was removed. (If they were kept until spasm in Müller's muscle had become a contracture, proptosis would be kept up for two reasons, first, because the muscle itself pushed the eye forwards, and secondly because the œdema induced in the orbital cellular tissues by the contracted muscle, caused further proptosis.) It was not the fault of the surgeon, but of the delay in the case coming for operation which was the cause of the permanence of the exophthalmos. If there was great proptosis and this disappeared, a bagginess of the lids would remain, particularly of the lower lid, which was very obvious.

In three cases the exophthalmos had been so pronounced that in two, an eye was lost, and in the other, while the eyes ultimately were saved, haziness of the cornea occurred. In two, the operation had been done when the patients were extremely ill; in the man with irregular heart, there was ascites, also œdema of legs, thighs, trunk and arms. The arms had striæ from œdematous distension as marked as on the abdomen of a parturient woman. In these two the eyelids had been stitched together by an ophthalmologist. In one the eye had been lost first. The contents had been extruded into the bed in the hospital and the lids stitched together to save the other. The exophthalmos had entirely disappeared after operation. The patient was wearing one glass eye to replace the lost one. In the man, the exophthalmos had been the worst Mr. Dunhill had ever seen: with the strangulated conjunctiva and the purulent discharge, he looked quite weird. On account of the œdema all over his body, his irregular pulse and dilated heart, he had been quite bedridden and scarcely a good surgical risk. He was now, not entirely a healthy man, but the operations were done seven years ago, and he was getting about very comfortably. It had not been possible to separate the lids accurately between the upper and lower lashes; the separation had to be made partly at the expense of the lower lid; but the upper lid came well down on to the iris. The third case showed a destroyed eye. In a good many cases they had seen the eye had receded almost completely after operation. In some not so completely. But it was obviously not right to make a general statement to the effect that the exophthalmos did not disappear.

He had operated on many whose hearts were irregular, and on some who had suffered from proved auricular fibrillation. Not all of these had lost the

¹ *Lancet*, 1916, ii, p. 815.

fibrillation (again it was a question of the length of time or the extent of the damage), but the only two of this type upon whom he had operated in London had each completely lost the fibrillation. He showed the electro-cardiograph tracing of the heart of one before the operation, and she had been seen and examined by different physicians at St. Bartholomew's Hospital at the time. He had also the electro-cardiograph tracing subsequent to operation. It showed no trace of fibrillation, and the pulse was regular. The patient was doing heavy housework, and on the first day after she returned from the Convalescent Home, she did the arrears of household washing.

He could multiply histories of such cases, but they would all be similar to those he had shown. He had shown different types of cases, each illustrating in some way the great and enduring damage caused by this disease and the measure of relief.

Sir William Hale-White had stated that those selected for operation would be chiefly from mild cases. This had not been so in his (Mr. Dunhill's) cases. Dr. Murray had stated that "in mild cases operation was not necessary. In severe cases with marked cardiac failure the risk was too great. In a certain number, of moderate severity, in which adequate improvement has not resulted, operative measures may be advised." If that was the attitude taken, cases would drift into ill-health and visceral damage, and come to the surgeon too late.

Next, what degree of improvement might be attained in the ordinary, but strongly marked case, which was resistant to medical treatment. Their criteria were the pulse-rate, the exophthalmos, the tremor, the menstrual condition, the muscular weakness and mental agitation. The lady who still had the proptosis was important, for as stated in Dr. Mackenzie's Bradshaw Lecture of 1916, her pulse-rate and other symptoms were recorded at a period subsequent to the removal of the first lobe, when there still remained a large amount of gland tissue (for she had a big goitre). That record could be compared with her condition there that day. Then she had been plumper, calmer than before the operation, menstruation had returned, tremors were less, but the exophthalmos was the same, and the pulse-rate was 144. Now, with a further amount removed—four years ago—the pulse was 92, when she was confronted by an ordeal like this, and it was to be remembered that she was a young girl. Her father said that she danced, swam and played tennis.

One of the two nurses shown that afternoon, whose case had already been mentioned, could now do anything, and was at hard work. The other for a good while previous to operation had been compelled to give up work; first for seven months, then she had tried light cases, but had to give up completely and for ten months before he operated in April, 1917, she could not work. It was spoiling her life. She had had exophthalmos and all the other signs and symptoms. Her eyes were now so nearly normal that proptosis could scarcely be detected. She was performing her full nursing duties, had travelled up from Brighton that afternoon and was going back to her case that night.

The other lady whom they had seen that afternoon, Mrs. O., was similar in type; she was now managing her house; she played golf and tennis and was absolutely well. Her exophthalmos had disappeared.

Without using the word "cure" one might state that all these cases could be placed on an industrial level—a level at which they were able to carry on their household duties, earn their living, bear children, dance and swim. This result was not always or often going to be obtained by removing one lobe and

the isthmus, or by combining this with ligature of the superior thyroid artery of the opposite side. That was a very important point and was intimately bound up with his third point, viz., permanence of the gain in health.

Albert Kocher had stated at the discussion at the Society in 1912¹ that partial excision of the second lobe was only exceptionally necessary, and that it was an unsafe procedure on account of danger from hæmorrhage. He (Mr. Dunhill) could not regard either statement as true. There were a great many cases which would not be cured without removal of a portion of the second lobe—he would say that hardly any of the bad cases were sufficiently improved unless that was done. As regarded its safety, he had never yet lost a patient at a second operation on a case of exophthalmic goitre.

This aspect of the subject demanded close scrutiny, for, in his opinion, it was the crux of the whole matter. Some physicians were dissatisfied with the degree of improvement given by operation. This dissatisfaction had been voiced repeatedly. Many surgeons stated that they removed one lobe, the isthmus, and perhaps ligatured an artery on the opposite side, leaving a lobe it might be twice, or several times as large as the normal thyroid gland, and a cure was expected! This could not be so. He knew there were some cases in which removal of one lobe might turn the scale, and allow a patient to regain an equilibrium, particularly in early cases, or in cases which were very nearly winning their own battle. But these were not the sort of cases which were generally sent to the surgeon. Thirteen years ago, or more, he had recognized that this would not cure—nor permanently improve—bad cases, and he had pointed this out strongly in 1909.

Some would ask, why not remove sufficient at one operation? That was unsurgical. There were some patients in whose case judgment or instinct indicated that it should be done, and it was done. But there were other cases in which removal of a lesser amount would improve the patient sufficiently. They had no right to remove from an individual more than was necessary to achieve the purpose. Two instances would illustrate his meaning. In the case of the lady whom they had seen, who had had auricular fibrillation, the removal of the first lobe had calmed her intense agitation, she was obviously less restless, but there was little difference in her heart condition. They had seen what removal of portion of the second lobe achieved. A young woman, a typically severe case, but without obvious visceral degeneration, had not been sufficiently improved after a second operation to be regarded as on an industrial level. Her pulse had been still too high, and she had had some exophthalmos and tremors; a third portion had been removed. The pulse had at once become normal, the eyes were now absolutely normal, and she had spent her next holiday mountain climbing with a friend, carrying her rucksack and sleeping in mountain huts. That was eleven years ago, and she was quite well. This must be done, it must be done not infrequently, if health, approaching cure, was desired.

It would be asked, was one sure that sufficient gland tissue was left? Yes, he was sure that sufficient was left. He had watched these people for years. He had lived in the same city with them, seen them at work, met them at social functions, known them through their pregnancies and their menopause, and the only one about whom he had had any doubt was a patient who had some rheumatic pains in her wrists which seemed to be removed

¹ *Proceedings*, 1912, v (Sect. Surg.), p. 91.

by giving small doses of thyroid. There was no other evidence of thyroid deficiency.

What was important in his opinion, was to leave the blood supply of the portion which was left, intact; the gland tissue would never atrophy, and he thought it would be more permanently efficient than a gland in which fibrosis and cell atrophy had been induced by X-rays.

So far he had spoken of the necessity for at least considering operation, and of the degree of improvement. Next, what made for safety of operation? He could not give accurate statistics on account of his very rapid moves during the last six years, backwards and forwards twice during the war, and then again to England. But he knew that the death-rate was extremely low in cases operated upon at any reasonable period during the course of the disease, and that it rose according as one was prepared to undertake grave surgical risks in order to try to save lives in cases which came far too late to a surgeon. One who operated for statistics would let many patients die who might be restored to a fair measure of health. One who was willing to operate upon some of these would save many—he would lose some. But it was not the surgeon to whom these latter deaths should be credited.

A thyroid operation in Graves' disease differed in many respects from, say, a stomach operation, in which the chief consideration for the patient was that the work should be carefully and accurately done; and where it was not of great importance to the patient whether it took twenty minutes or one and a half hours, so long as there was careful handling.

An abdominal operation one thoroughly enjoyed. An operation for Graves' disease had never been done by himself without fear and great anxiety, even in cases which seemed simple. The fear and the anxiety began as soon as it was known that the operation was inevitable, and it did not cease until some days after the operation had been done. He pleaded for operation earlier than was usually done. It would be safer, it would free the patient, physician and surgeon from anxiety. The operations would be less extensive, the tragedies, whether of death or ill-health, would be prevented, and patients would be restored to a degree of health unattainable when operation had been postponed too long.

SIR WILLIAM HALE-WHITE

said that before they could decide upon the proper treatment of any disease it was necessary to know the life-history of those afflicted with it. In the *Quarterly Journal of Medicine* (vol. iv, No. 13) he published the results of an inquiry into the after-history of every patient suffering from exophthalmic goitre who had been in Guy's Hospital from 1888 to 1907 and of every private patient he himself had seen. After deducting cases operated on and those which could not be traced, 102 remained for consideration. Contrasting their after-history with the expectancy of life of healthy females of the same period of life it appeared that the mortality of sufferers from exophthalmic goitre was about twice as great as it should be. This, however, gave too serious a view of the mortality, for in the first place sufferers from exophthalmic goitre were of such an age that but few healthy persons of the same age died, and therefore a double mortality was not a great mortality; in the second place, his cases were all either ill enough to come into hospital or seek a second opinion. The conclusion seemed justified that persons with exophthalmic goitre had not an expected mortality much higher than normal. This was borne out by the fact that the disease was unusual in the post-mortem room. But it was

rarely seen in elderly persons, therefore it must be a disease the natural tendency of which was to get well. His figures bore this out, for among the hospital-traced cases 65 per cent. got quite well, 30 per cent. were much better, and 5 per cent. were better in some respects. Among the private-traced cases 74.5 per cent. got quite well, 19.1 per cent. were much better, and 6.4 per cent. were better. The most interesting causes of death were enteritis and diabetes. It was impossible to allude in detail to all the cases, but to show how well some of them did the following were mentioned: Female, aged 21; a severe case in all respects; had glycosuria. Fourteen years later was normal, no glycosuria. Female, aged 23, a very severe case; seven and a half years later was quite well. Female, aged 29, very severe case; got practically well. Female, aged 20, severe case; wrote twenty years later to say that she was working hard and has done so for eighteen years, was married, had three children, and was now a widow. Female, aged 23, medium case; wrote to say that she was married, had six children, and had not required any treatment for eleven years.

Nowadays the difficult question that always presented itself was whether or not they should advise an operation. With the present state of their knowledge they had not sufficient evidence to answer this question. In order to do so they required the after-history, for a period of twenty years, of at least 100 cases submitted to operation. Then they could learn whether the expectancy of life in such cases was better than in those not operated upon, and whether they got well sooner, for not all the cases operated upon got quite well, some were only considerably improved. They would also learn whether the patients, having had half their gland removed, were more liable to myxœdema, and how often they relapsed. There was also the difficulty that the slight cases hardly needed operation, and the danger of it was considerable in the very bad cases. Most of those who were especially interested in the subject could recall deaths either during or immediately after operation, and they must give the patient the opportunity of deciding whether she was willing to run this risk for the cure of a disease the natural tendency of which was to get well. Probably, however, with increasing surgical skill, the risk was diminishing. The following case illustrated that an operation might be advised unnecessarily: A woman was admitted to a surgical ward for operation for exophthalmic goitre. After she had been in a few days, and before the operation, signs of typical typhoid fever showed themselves. She was transferred to a medical ward, and under the rest in bed necessitated by the fever, she got completely well of her exophthalmic goitre.

He (the speaker) was not arguing against operation, but was only urging that to bring forward a few cases shown some months after operation was not proof that surgical treatment was best, for it was as easy to show cases which had done just as well without operation. It was notorious that patients with acute peritonitis, empyema, and many other conditions did very badly if operation were not undertaken, but they knew that exophthalmic goitre was a disease the natural tendency of which was to get well, and therefore at least a hundred patients who had been operated on would have to be followed for about twenty years before they would have sufficient data from which to draw a conclusion.

Dr. J. STRICKLAND GOODALL

said that, whether patients were treated from a medical or surgical standpoint, the condition of the heart was of greatest importance. Working in collaboration with Mr. Berry, he had been carrying out investigations of the heart

disorders in Graves' disease, and had made many hundreds of observations. The basal metabolic rates as tested by Benedict's machine would probably prove very useful. He had recently used a modified form of the machine by which graphic records could be obtained. He had come to the conclusion that a patient suffering from Graves' disease probably died from ventricular fibrillation, in the production of which two factors were concerned—pre-existing myocardial degeneration and high blood pressure. The dangerous case was that in which there was definite myocardial degeneration, and in which the blood pressure was high. There had been differences of opinion as to the usual blood pressure in exophthalmic goitre. He thought that it was tri-phasic, the first phase being a transient rise, the second a fall, and the third a rise again.

(The meeting was adjourned till Friday, February 25.)

Clinical Section.

President—Sir ANTHONY BOWLBY, K.C.B., K.C.M.G., K.C.V.O.

(Joint Meeting with the Sections of Medicine and Surgery.)

DISCUSSION ON THE MEDICAL AND SURGICAL TREATMENT OF GRAVES' DISEASE.¹

Mr. DONALD ARMOUR

said that it was to be regretted that a name based on its pathology had not yet been adopted generally for the symptom-complex which they were discussing. "Exophthalmic goitre," descriptive of two of its most obvious symptoms, was often a misnomer from the absence of one or other, or both of them. Moreover, the addition of the qualifying terms "true" and "false" as had been suggested, would only add to the confusion. The calling of a disease by a writer's name was a questionable expedient and in the present instance did a grave injustice to the old Bath physician, Parry, whose full clinical description antedated that of Graves by some years. He would urge that the term "hyperthyroidism" should be more generally applied to this disease as being a more accurate and scientific description of the condition.

His experience of the surgical treatment of the disease extended now over some fifteen years and included some 200 cases.

Treatment of a disease to be scientific and efficacious must be based on its pathology. Surgical treatment was based on the view that this disease was primarily a disease of the thyroid gland and that the resulting symptoms were due to a disturbed function of that gland, "probably to hypersecretion of materials which induced a sort of chronic intoxication" (Osler).

Surgical treatment was directed to lessening the overaction of the gland or diminishing the amount of its perverted secretion, either by reducing its blood supply by ligature of arteries or by ablation of more or less of the gland substance. That these results were more certainly and more permanently attained by surgical treatment than by other means he was convinced.

But it was only fair to inquire at what risks to the patient were these results attained. That with greater experience in operative and anæsthetic technique and increased knowledge of the disease itself these risks had been enormously reduced in the last few years he thought no one would deny.

The general anæsthetic bogey which used to loom so large on the surgical horizon of this disease, had he hoped been laid finally to rest. A technique evolved by a skilled anæsthetist from long experience of these cases and

¹ At an adjourned meeting of the Sections, held February 25, 1921.

disorders in Graves' disease, and had made many hundreds of observations. The basal metabolic rates as tested by Benedict's machine would probably prove very useful. He had recently used a modified form of the machine by which graphic records could be obtained. He had come to the conclusion that a patient suffering from Graves' disease probably died from ventricular fibrillation, in the production of which two factors were concerned—pre-existing myocardial degeneration and high blood pressure. The dangerous case was that in which there was definite myocardial degeneration, and in which the blood pressure was high. There had been differences of opinion as to the usual blood pressure in exophthalmic goitre. He thought that it was tri-phasic, the first phase being a transient rise, the second a fall, and the third a rise again.

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working in frequent association with him had relieved him of all anxiety with regard to the anæsthetic, which in his practice was always a general one. In those cases in which from the condition of the patient it was thought advisable to "steal the gland," as Crile called it, the method as carried out by his colleague, Mr. H. M. Page, was briefly as follows: The preliminary treatment was described to the patient as consisting of hypodermic injections and rectal enemata. For several days preceding the operation hypodermic injections of distilled sterile water were given, followed by small saline injections *per rectum*. The saline was changed to olive oil for a day or two and finally on the day fixed for the operation, of which the patient had no knowledge, a hypodermic of morphine and atropine was given, followed by olive oil and ether by the rectum. He had found rectal ether an ideal anæsthetic for operating on these cases. Chloroform as an anæsthetic should never be even mentioned.

But the anæsthetic bogey looked like being replaced by another one—that of damage to the recurrent laryngeal nerve. Unquestionably injury to the recurrent laryngeal nerve at the time of operation might and did take place and was a very serious operative result. But that it could be avoided by skill and experience he was equally sure.

A specimen had been shown recently at one of the Sections of this Society in which the recurrent laryngeal nerve before going into the larynx broke up "into a leash or plexus." The opinion was expressed that "that was probably invariable and it was almost impossible to enucleate the lateral lobe of the thyroid without damaging one of these branches."

To learn about this, to him, new behaviour of the recurrent laryngeal nerve he had consulted his friend, Professor Arthur Keith, who told him he had knowledge of such behaviour from the work of Mr. F. G. Parsons at St. Thomas's Hospital, but that it was "probably invariable" he did not agree. Nor had a search of the anatomical and pathological specimens in the Hunterian Museum, which Professor Keith undertook with him, revealed a single example of such behaviour. Nor had Professor Keith agreed with the second deduction because as he pointed out the nerve neither entered the gland nor pierced the capsule, and this, in his opinion, with reasonable care, could be easily avoided during the operation. The requisites for this, in addition to a knowledge of the anatomy of the part, were the use of the greatest gentleness and deliberation in that part of the operation which had to do with the gland itself. And he thought the risk was still further reduced by following Charles Mayo's suggestion of wiping down the capsule off the gland with gauze. Further, the inferior thyroid vessels should be secured within the capsule as near the gland substance as possible. "Considerable traction on the gland and free use of the scissors" as described by one writer would certainly, sooner or later, result in injury to this most important structure.

A difficult question to be decided was how much or how little gland substance should one remove to obtain the desired results. He (Mr. Armour) had always acted empirically and removed one lobe, the larger if they differed in size, together with the isthmus. Other surgeons did likewise and advised further subsequent removal if indications arose. But might not this method result in the removal of too much of the gland at the first operation? It was surely so judging by the result in the case he had shown on the afternoon of the last meeting. A hemithyroidectomy had been done with excellent results as far as the hyperthyroidism was concerned but the patient had now gradually developed symptoms of hypothyroidism, which were only controlled by the administration of thyroid extract. Would it not have been sufficient to have

tied the superior arteries in this case? He would be interested to hear the views of other speakers on this point.

The ligation of arteries had a definite place in the surgical treatment of hyperthyroidism, either as a preliminary to future gland removal when the larger operation was contra-indicated, or as the only operation necessary. He had been much struck by the excellent results which had been obtained by ligation alone in a few cases, relieving one of the necessity of proceeding to the removal of any gland substance. He contented himself with the ligation of the superior thyroid vessels on both sides, either at one or two sittings. These two operations, ligation of vessels and the removal of more or less gland tissue were the only two that should have any place in the surgical treatment of this disease.

Every case of hyperthyroidism at any period of its course was not suitable for surgical treatment. And the same surgical operation should not be blindly applied to every case. The surgical treatment of hyperthyroidism was *not* an emergency operation and cases should come to operation only after such treatment by rest and medication had been undergone as was necessary to make them suitable for operation.

The symptoms contra-indicating immediate operation were progressive and rapid emaciation, acute cardiac dilatation and myocardial exhaustion, persistent vomiting and diarrhoea and marked mental symptoms. In general terms acute cases were also unsuitable for immediate operation. On the other hand, the cases called by Kocher "secondary Graves' disease" were particularly suitable for surgical treatment.

Dr. FLORENCE STONEY

said that she had collected 200 cases which she had treated with X-rays, either cases of primary Graves' disease or of Graves' disease following old bronchocele. Of these, seventy-eight had been quite cured and strong up to thirteen years after X-rays; one had slight myxœdema; sixty-six were much better and working, leading an ordinary though quiet life, some with slight symptoms, some with heart overstrained: that was, 145 were leading useful lives; twenty-one were no better. Since treatment, ten had died: three from Graves' disease from insufficient treatment, being removed from her care too soon; two from heart failure; two from mania; one from operation on thyroid; one from uræmia; one from cause unknown—probably heart failure.

The list of 200 cases she had handed round comprised 185 women and fifteen men—the Graves' disease in all the men had been due to war conditions. At Fulham Military Hospital she had had numberless cases shading away from very marked symptoms to the merest disordered action of the heart, but she had only included quite definite marked cases in her list.

Graves' disease was not primarily a surgical disease nor an X-ray disease; it was essentially a physician's disease. McCarrison had proved that bacterial toxins irritated the thyroid, and Sir Arbuthnot Lane had proved that intestinal stasis irritated it. In order to get a case of Graves' disease well there were two things to be done: (1) Lessen the thyroid gland; (2) remove the cause of the hyperthyroidism.

How were they going to lessen the thyroid gland? The physician should call in the help in every case without exception of either the expert radiologist or

the surgeon, in order that part of the over-active thyroid might be removed—that was, to undo the mischief to the thyroid which was already present. Nature it was true did occasionally bring back the thyroid to normal activity after long and weary months and years during which the patient was laid aside from all active life—resting, resting, and yet resting—many could not afford the time. But why subject any unfortunate patient to such a tedious and fairly hopeless regime when X-rays, acting as a specific, quite easily and comfortably, without the least pain or unpleasantness, would surely bring about this partial atrophy of the thyroid, and that atrophy could be pushed to any extent which might be desired. The patient just lay on the X-ray couch where she sometimes went to sleep.

This resulting atrophy was attained quite rapidly in a recent case—early X-rays were very important—as for example (Case 19): a factory girl had been in bed three months and had received eight X-ray treatments. She had done most excellently; there had been slight recurrence three years later when working hard, but she was cured by two X-ray treatments. It was noteworthy that these cases often returned for a few X-ray doses when they felt run down. Another case (No. 136) was that of a soldier who had been completely cured with six X-ray treatments. No. 139 was that of an officer who had been cured of everything but exophthalmos in twelve exposures; his pulse (112) came down to 80, and now after five years strenuous teaching he said he “never got tired.”

How different was a long standing case in which the patient had had to struggle for years against the disease, often a bronchocele breaking down. Then X-ray treatment to be successful had to be much prolonged, and needed courage and patience from all concerned—especially where sepsis was pouring poison into the thyroid at every minute of the day (as happened in very many cases).

X-rays, or surgery of the thyroid, either of them, could diminish the amount of thyroid secretion entering the body, but that was all they could do. If time was of vital importance it was possible surgery might be best, but in all other cases X-rays would attain the same end, with the great advantage that the dose could be graduated, so as to ensure the exact amount of atrophy which was most desirable. This was done without the mental upset of repeated operations, without any risk to life, and without any pain. Some of Dr. Stoney's cases had been under a surgeon's knife and had relapsed—these cases would relapse sometimes unless the cause were removed. Any case she had wanted a surgeon to operate on he always said was too ill already.

The only three disadvantages of X-rays were the following:—

(1) The treatment was tedious (often lasting many months), because the cases were not sent at once on diagnosis in order that the necessary atrophy might be produced, or else they are not diagnosed soon enough. Was the radiologist here responsible? The longer they were left the longer must the X-ray treatment last.

(2) The frequent onset of telangiectasis, but with earlier treatment and better filtration, and with expert practitioners giving the treatment, they would see less and less of it.

(3) Scarring of the neck from excessive or prolonged treatment. This accident was of very rare occurrence. She had known it in three cases of her own, and in one case treated elsewhere (in this last case there was ulceration). It only occurred in cases in which the original irritant to the thyroid had not been removed.

And that was where cases repeatedly went wrong. This was not the fault of the X-ray treatment, but of the doctor looking after the case as a whole. Here was where a good physician (she said "good" advisedly) was needed—one who would remove the primary cause which was irritating the thyroid. So lately as last year a lady had been sent to her for X-ray treatment. She had been under treatment for the past six years at the hands of doctors, dentists and radiologists, yet her mouth was teeming with sepsis, and no one had yet recognized that sepsis as a vital factor in the causation of her years of ill-health.

One had to fight the dentist and fight the physician and fight the patient, and if the mouth be septic just insist on a mouth free from sepsis. These patients took an anæsthetic well—all this fighting should not be necessary. It should be taken as a routine that all such sepsis *must* be abolished.

The radiologist could only effect one portion of the cure, and there were six things to be done, at least! It rested with the physician to see to the removal of the *cause* of the excessive thyroid irritability, therefore besides (1) providing X-ray treatment he had (2) to remove all sepsis from the teeth (the skiagrams exhibited showed that septic matter might be buried at the apices of the roots), and sepsis due to such varied conditions as otorrhœa and appendix trouble; (3) to diminish intestinal stasis; (4) to prescribe walking exercise, especially route marching; (5) to secure mental quietude for the patient; (6) to submit the patient to further endocrine treatment. One alone of these items of treatment was not enough; all six were needed to make the cure complete.

At present patients were treated expectantly for months and were sent to the radiologist as a forlorn hope, and then physician and patient were surprised that the cure took months. For instance, what could be expected from a patient (No. 83) of whom her doctor had written: "For the last three to four years I have had a lady, aged 55, under my care suffering from exophthalmic goitre. All cardinal symptoms are present. Both Mr. Berry and Dr. Henry Head are of opinion that hyperthyroidism is the only cause. I have tried everything I can think of; she was submitted to some X-rays by our local light operator who is unskilled in this branch; it appears to me that expert administration of X-rays might help what now appears a hopeless case." And after these years of treatment, when she had come under the care of Dr. Stoney, she had marked oral sepsis and great constipation with irregular heart—yet she had improved for a time: but this case had been hopelessly late.

Here was another one with a better ending. This case was instructive seeing that many doctors still denied that pyorrhœa could be one cause of hyper-activity of the thyroid, or that the consequent disordered action of the heart occurred in the case of badly wounded men, as well as in that of the unwounded. If a man had a serious wound no notice was taken of this "neurotic" condition, and he was left to the comparative seclusion of his bed to recover grip of himself if he could.

Case 130.—B. L., private, aged 23, with seven months' service, was wounded in the left buttock and back at Hooze, Belgium, on September 25, 1915. The bullets were removed at a Canadian hospital in France, the wounds being septic.

October 20, 1915: Transferred to Fulham Military Hospital, London.

October 21: Skiagram showed comminuted fracture of left ischial tuberosity.

November 19: As they were still discharging, the two wounds were opened up, and much dead bone was removed. Temperature 103° F. afterwards.

December 12: Temperature normal, wounds healthy, general condition very unsatisfactory.

December 28: Patient seen by dentist, who advised extraction *when general condition was better*. (He did not suggest that the pyorrhœa and oral sepsis were primary to the heart condition, and therefore *must* be dealt with first if the patient were not to die.)

December 30: Very ill indeed; no albumin; no signs in chest; left foot swollen for two days.

December 31: On danger list; turned blue and faint even if moved in bed; put on digitalin and brandy. Ward Surgeon came to X-ray Department, of which Dr. Stoney was in charge, and asked her to "do what she could for patient, as he was going to die and there was nothing further to be done surgically." Patient very weak, emaciated, highly excitable. Wounded hip kept flexed; wounds looked healthy. Left leg and foot œdematous, with tenderness of popliteal vein and evidently thrombosis. Heart was slightly dilated, sounds feeble and *toneless*, no murmurs; pulse 138 (in the ward), 158 in the X-ray room; no exophthalmos, no goitre; tremor, perspiration and general nervousness all marked; abdomen doughy; constipated; teeth much decayed and very septic, mouth condition being about as bad as possible. General condition diagnosed by Dr. Stoney as due to hyperthyroidism, much aggravated, if not caused, by oral sepsis.

January 1, 1916: Patient carried in bed to X-ray room; too weak to be transferred to stretcher; full filtered pastille dose of X-rays given to each lobe of thyroid. Pulse 158 (lying down). Vigorous effort made to clear up oral sepsis by wiping round gums frequently with strong tincture of iodine.

January 3: Pulse distinctly better, 112. Tinct. iodi continued.

January 7: Second dose of X-rays; looked brighter; œdema to left mid-calf; tubes out of wound. Pulse 120 slightly irregular; perspiration very marked; mouth cleaner.

January 14: Fortunately abscess in left buttock required opening, bone was scraped and *at same time several septic dental stumps were removed*. In spite of his very weak condition patient took open ether well, pulse being 136 at beginning and only 120 at end of anæsthetic.

January 26: Third X-ray treatment. From that date onward X-rays given at about weekly intervals till end of April, ending May 27, 1916, with seventeenth treatment.

Digitalin and brandy discontinued early in treatment of case. Tinct. iodi continued till April 12 when mouth appeared clean.

General Condition.—Even by January 7 looked brighter and not so likely to die. By February 10 still brighter; temperature normal; always in pain; wound closing; less perspiration; less tremor; heart nearly regular; stronger; pulse 134 over heart when lying down, some beats did not get through to radial artery. Cigarettes cut down to five *per diem*.

February 16: No tendency to faint. Pulse 114 (lying); right leg normal, left leg flexed and swollen.

February 29: Pulse 104 lying down (86 in ward); no dilatation of heart, first sound still toneless. Getting fatter; tremor and perspiration slight; wounds healing.

Shown at a clinical meeting and pronounced "a resurrection."

March 9: In bath chair. Pulse 116 (sitting); upper back wound still open.

March 15. Pulse 104 regular (sitting).

April 8: All healed. Pulse 86 (sitting); 76 (lying); first cardiac sound stronger and regaining tone—slight tremor, no perspiration. Walking on crutches; left leg much crippled and left foot œdematous. Eating well; sleeping well; not nervous; mouth clean; bowels regular.

April 14: Pulse 76 (sitting); no symptoms at all of hyperthyroidism. Left leg getting straighter, still flexed and adducted at hip-joint.

Expert massage and movements now begun; at first patient was in great pain and could not put foot to ground, but after twenty-eight treatments there was less shortening and he could get good weight on foot without pain as he walked.

May 11: Trace of tremor; pulse 92.

May 27: Feeling well; putting on flesh. Pulse 80 (both standing and lying down);

no tremor; no perspiration; no nervousness; few teeth but eating well. Left hospital and discharged from Army.

October 1917, i.e., eighteen months later: Wrote that he was perfectly well and had resumed work as a pitman down a mine in Scotland.

Events had seemed to show that the combination of stopping the source of the poison by radical daily cleansing of the mouth, and treating the over-stimulated thyroid by X-rays to cause partial atrophy, had turned the balance between life and death, the myocardium recovering tone and functioning correctly *when no longer poisoned*.

The tonelessness of the cardiac first sound was distinctly characteristic of hyperthyroidism. Cases such as that might be recognized and diagnosed earlier as to the true source of the symptoms, and treatment consequently started at a much earlier stage. Without excellent nursing the man would have inevitably succumbed.

She (Dr. Stoney) hoped that doctors would not wait for evidences of exophthalmos or goitre, but would diagnose thyroid trouble even when neither of these were present—when the patient might be “merely run down, with a rapid pulse;” she also hoped that a rapid toneless first sound, resembling a second would be recognized as *due to thyroid trouble*, and treated as such. This would save many a patient months of illness. Doctors should ensure early atrophy of the thyroid by X-rays as part of their routine treatment just as much as in giving cascara.

Earlier diagnosis and earlier *efficient* treatment by dentist, physician and radiologist combined was what was wanted in order to obtain rapid cures. This course of action would prevent the heart from becoming hopelessly overstrained. In many of her cases one sad point was that the heart had become overstrained by years of illness before treatment was commenced, and so had never returned to complete health, but remained feeble. The patient then had to lead a quiet, subdued life, instead of an active vigorous one.

Other difficulties connected with these cases were the following:—

(1) Many could not alter the course of their lives, but were obliged to return to the conditions which had caused their illness.

(2) When mental worry was the cause it was difficult to remove it.

(3) Cases with exhaustion from excessive brain work recovered slowly; in the treatment of these other endocrine gland preparations might afford help.

(4) Old breaking down bronchoceles recovered more slowly than primary Graves' disease, and were liable to break down again; in these cases injection of suprarenal extract sometimes produced miraculous effects; lymphoid compound might also prove successful.

Stoney: *Treatment of Graves' Disease*

TABLE I.—FORTY-EIGHT CASES OF EXOPHTHALMIC GOITRE TREATED WITH X-RAYS

Number of case and initial	Age	Occupation	Duration of illness before X-rays	Pulse		Exophthalmos		Goitre		Tremor		Oral sepsis	
				Before	After	Before	After	Before	After	Before	After	Before	After
1908													
1 Miss B. ...	25	Factory	—	136	72	+	0	+	Slight	+	0	+	0
2 Miss H. ...	23	Service	—	136	80	+	0	+	0	+	0	—	—
3 Mrs. W. ...	26	House	—	122	112	—	—	+	—	+	—	—	—
1909													
4 Mrs. C. ...	38	House	—	128	120	—	—	+	—	+	—	—	—
5 Miss W. ...	24	—	—	120	—	—	—	+	—	+	—	—	—
6 Mrs. D. ...	46	House	—	136	84	+	Slight	+	0	+	0	+	+
7 Miss W. ...	17	Nil	—	80	80	+	0	+	0	—	0	+	—
8 Miss B. ...	33	Maid	6 years	124	72	+	0	0	0	—	0	+	+
9 Miss S. ...	30	Dispenser	—	120	80	0	0	+	0	+	Slight	—	—
1910													
10 Miss E. ...	20	—	—	132	86	0	—	—	—	+	0	—	—
11 Mrs. W. ...	39	House	—	132	92	+	0	+	Softer	+	—	—	—
12 Mrs. S. ...	29	House	—	132	80	+	Slight	+	Slight	+	Slight	+	+
13 Miss R. ...	24	—	—	110	96	+	0	+	Less	—	—	—	—
14 Miss P. ...	37	Housek'pr	—	132	96	+	Less	0	0	+	+	+	+
15 Mrs. W. ...	28	House	—	148	140	0	—	+	—	+	—	—	—
16 Mrs. H. ...	41	House	—	136	88	0	—	+	Less	+	Less	+	Less
17 Miss B. ...	33	G.P.O.	—	120	96	0	0	+	Less	+	0	—	—
18 Mrs. F. ...	45	House	—	112	80	+	Less	0	0	—	—	+	+
19 Miss R. ...	18	Factory	—	160	120	0	0	+	+	+	+	—	0
20 Miss P. ...	26	Student	—	136	96	+	Less	+	Less	+	Less	—	—
21 Mrs. T. ...	41	House	—	148	100	+	Slight	+	Slight	+	0	+	+
22 Mrs. W. ...	30	House	—	100	72	+	Less	0	0	—	—	+	+
1911													
23 Mrs. B. ...	39	At home	—	120	84	+	0	+	2 1/2 in. less	+	0	+	Less
24 Miss H. ...	49	At home	5 years	132	100	+	+	+	+	+	+	+	Less
25 Miss H. ...	24	Teacher	—	136	72	+	Less	+	0	+	Slight	+	0
26 Miss L. ...	54	Doctor	—	134	84	+	Less	0	0	+	+	++	+
27 Miss K. ...	33	G.P.O.	—	108	96	0	0	+	Slight	+	0	+	Less
28 Miss B. ...	24	G.P.O.	—	136	112	+	0	+	Less	+	0	0	—
29 Miss H. ...	39	G.P.O.	—	116	72	0	0	+	Slight	+	0	+	Less
30 Mrs. G. ...	63	House	—	96	88	0	0	+	Less	+	Less	No teeth	—
31 Miss S. ...	28	Nil	—	120	60	+	0	+	0	0	0	No teeth	—
32 Mrs. B. ...	44	House	—	120	88	0	—	+	—	0	0	+	Less
33 Mrs. B. ...	36	House	—	128	100	+	—	+	—	+	—	+	—

BY DR. FLORENCE STONEY. PUBLISHED 1912; BROUGHT UP TO DATE 1921.

General health	Number of X-ray treatments	Result 1912	Later notes
Overwork between home and factory; rapidly going downhill before X-rays	—	Well	Four years later: Well, married
In sanatorium with hæmoptysis at 16	—	Well a year ago	Worked hard 8 years, then heart giving way (1916), also phlegm
—	8	Gave up	
—	3	Gave up	
—	2	Gave up	
—	—	Better than for years	Two years later: Keeping well, one child epileptic; 1921: Very well, eyes normal, working hard, pulse 85, "thankful for the wonderful treatment"
—	10	Better, dysmenorrhœa less	1921: Married, now pregnant
—	—	Remarkably well	Slight recurrence after motor accident; 1919: Pulse 80, no symptoms; working
—	—	Well eighteen months later	1919: Doing war work in a large hospital for over 4 years
—	14	Better in self	
—	—	Much better	
—	14	Much better	July, 1912, two years later: Pulse 120, exophthalmos 0; goitre, 0; tremor +; much worry with sick children. Said "X-rays made a new woman of me; I feel well now except for the trembling." 1921: Well, pulse 80
—	12	Much better	
—	—	Teeth bad; feels better	
—	2	Gave up	
Starved	8	Better	1912, recurred: Pulse 116, goitre tremor, had more treatment and improved in general health. 1921: Health indifferent, pulse 100
Well nourished, finds telegraphy trying	—	Better; back at work	1920: More X-rays; working till 6 months ago; pulse 88; goitre 0 when married; gone to Canada; very well
—	3	Gave up	1913: Recurred; teeth filthy; no further treatment
—	—	Acutely ill	1913: In robust health; working hard; pulse 80; goitre 0; tremor 0
—	—	Going on well	1914: Cured by radium in America (burn 10 months); sister also exophthalmic goitre
—	—	Was well a year later	1921: Well ever since; pulse 78; did not mind air raids
—	—	Better	1915: Many bad teeth out; exophthalmos; otherwise well
—	—	Feels quite well	Splendidly fit and playing golf again without getting tired
—	—	Gave up too soon; was, however, much better than with other treatments she had tried	Can do fair amount quietly, heart feeble; pulse 88, irregular; no other symptoms
—	—	Feels well; working	1921: Married, 2 children, teaching during war; slight myxœdema (controlled by thyroid), otherwise well; pulse 70, regular
Working; debility, irregular heart	—	Better; still under treatment	1913: Able to enjoy life again; 1914, died of heart failure
—	—	Working; morbus cordis	1921: Housekeeper, rests daily; pulse 120; leads ordinary life, not easily tired
—	—	Very well	1921: Working ever since; pulse 84; goitre small, much better
—	—	Working; morbus cordis	Not strong. 1921: Working hard, not strong.
—	—	Better	
—	—	Heart very irregular; not working	Heart remained irregular.
—	—	Six weeks' treatment; much better	
—	3	Gave up	

TABLE I (continued).

Number of case and initial	Age	Occupation	Duration of illness before X-rays	Pulse		Exophthalmos		Goitre		Tremor		Oral sepsis	
				Before	After	Before	After	Before	After	Before	After	Before	After
34 Miss S. ...	22	Service	—	136	120	0	0	+	0	+	0	—	—
35 Miss M. ...	18	G.P.O.	—	186	120	0	0	+	+	+	+	—	—
36 Mrs. D. ...	34	House	—	180	84	0	0	+	Slight	+	0	+	0
37 Miss W. ...	24	G.P.O.	—	141	92	+	Slight	+	0	+	0	+	+
38 Mrs. B. ...	53	House	—	92	72	0	0	+	0	0	0	+	+
39 Mrs. C. ...	38	House	—	108	80	0	0	+	Slight	+	0	—	—
40 Miss B. ...	27	Doctor	—	116	104	+	0	+	Less	+	Slight	+	+
41 Miss W. ...	33	House	—	120	106	0	0	+	+	+	+	++	++
42 Miss C. ...	26	Service	—	100	80	0	0	+	+	0	0	+	+
43 Mrs. S. ...	39	House	—	140	104	+	—	+	—	+	0	+	No teeth
1912 44 Mrs. T. ...	32	House	—	116	104	+	Less	+	Less	+	Less	+	—
45 Mrs. L. ...	22	House	—	92	92	+	—	0	—	+	—	+	—
46 Mrs. C. ...	36	House	—	124	128	0	—	+	—	+	—	+	—
47 Miss H. ...	19	Service	—	128	112	+	+	+	1 in. less	+	Less	—	0
48 Miss W. ...	51	Companion	—	126	84	0	0	0	0	0	0	No teeth	—

TABLE II.—FURTHER CASES OF EXOPHTHALMIC GOITRE

Number and Name	Age	Occupation	Duration of illness before X-rays	Pulse		Exophthalmos		Goitre		Tremor		Oral sepsis	
				Before X-rays	After X-rays	Before	After	Before	After	Before	After	Before	After
1912 49 Miss S. S. ...	24	—	—	112	104	+	—	—	in.	+	—	+	—
50 Miss E. W. ...	22	—	1 year	132	88	+	0	+	3 less	+	0	+	Less
51 Miss L.A. ...	20	Tie work at home	2 years	132	108	Slight	—	Large	3 less	+	0	+	+
52 Mrs. C. ...	34	House, two children	6 years	128	88	0	—	+	Less	0	—	+	+
53 Mrs. B. ...	27	Keeps house for five Char	Over 1 year	100	112	0	—	Small	—	0	—	+	Less
54 Miss N. B. ...	35	—	14 yr. since curetting	108	120	+	—	0	—	+	—	+	—
55 Mrs. M. ...	30	—	8 years	136	120	+	+	+	+	0	0	+	0
56 Miss N. J. ...	34	—	6 years after influenza	148	120	0	0	0	0	+	0	++	++
57 Miss M. F. ...	24	Factory	3 years	112	72	++	Less	+	14 less	+	0	++	0
58 Miss A. M. ...	19	Telephone	2 years	120	84	0	—	Large	Much less	+	0	0	—
59 Miss M. B. ...	22	G.P.O.	1½ years	140	120	+	+	+	Less	+	Slight	Slight	Slight
60 Mrs. H. ...	28	House	1 month	120	100	Slight	0	+	—	+	0	+	Less

TABLE I (continued).

General health	Number of X-ray treatments	Result 1912	Later notes
—	—	Epileptic fits completely stopped; the fits (average 20 <i>per diem</i>) completely stopped during treatment	1913: Working, only two fits since; pulse 116, no other symptoms. 1921: General health better; married; pulse 144, after influenza; "throat cured by X-rays"
—	—	Died from operation in Edinburgh	Goitre disappeared
—	—	Quite well	Well; can walk five miles; resuming work; pulse 84
—	—	Nearly well; still under treatment	Well, except indigestion
Half starved	—	Well	One year later, "feeling fine; I am so well."
Exhausted	—	Perfectly well	1921: Well and strong, working hard, neck atrophic; pulse 76
—	—	Better; still under treatment; teeth bad	
Poor physique	—	Not done well; imbecile	
—	—	Better; still under treatment	
—	6	Too ill to continue to come for treatment	Five months later without rays is no better; further X-rays and distinctly better
—	—	Acute; better; still under treatment	
—	4	Gave up	
—	9	Very dizzy	
—	—	Acute; better; still under treatment; tonsils huge; gained 10 lb. in 3 weeks	Tonsils diminished; worked hard two years, then rheumatic fever, which left heart a wreck. 1916: no sign of exophthalmic goitre
—	—	Feels rather better; still under treatment	Can lead a quiet country life

TREATED BY X-RAYS BY DR. FLORENCE STONEY.

General health	Number of X-ray treatments	Result at end of treatment	When last heard of	Notes
Mitral stenosis; psoriasis	2	—	—	Gave up too soon
T. A.	19	—	1921: Married; much better; pulse 84	Dermatitis once; felt fine after two months
—	15	Considerable improvement	—	Less nervous
Pleurisy, pericarditis; 4 months' pregnant	5	Much better	1921: Better, light housework; no goitre	Ill-nourished; adenoma of thyroid
—	6	Gave up too soon	—	Very overworked
Faints, hysteria, menorrhagia	7	Unsatisfactory; looks better	—	Overworked; not done well
—	10	Not enough treatment	1921: Much better; pulse 65; no goitre, exophthalmos still; own housework; "a wonderful cure"	Dermatitis slightly once; husband 2 years out of work, gets 15s. weekly
Menstrual periods irregular; half starved	23	Unsatisfactory, could not spare time to come	—	Home circumstances very poor and bad; month hopelessly septic
Menstrual periods irregular; in bed months	60	Final health good	1920: Exophthalmos troublesome, eczema and scarring of neck; telangiectasis; working hard since 1912 as housemaid; pulse 80	Result slow from septic mouth; clean after 6 years
Palpitation, anæmia	8	Better	1921: Married, one child; very well	Brighter after 1 month
Appendicitis, would not have operation	30	Unsatisfactory	Became mental, and died of Graves' 1 year later	Lived at Maidstone; journey made treatment hopeless
Rheumatism, sore throats	5	Nerves better	1921: 2 years' good health, then tubercular bladder	—

TABLE II (continued).

Number and Name	Age	Occupation	Duration of illness before X-rays	Pulse		Exophthalmos		Goitre		Tremor		Oral sepsis	
				Before X-rays	After X-rays	Before	After	Before	After	Before	After	Before	After
61 Mrs. O'K. ...	22	House	2 years	120	104	Slight	0	in. +	in. Less	+	0	+	+
62 Miss N. O. ...	26	Milliner	6 months	140	120	+	—	+	—	+	—	0	—
63 Miss E. L. ...	35	At home	10 years	106	80	+	—	0	—	0	—	+	Less
64 Miss C. J. ...	31	House	3 years	132	98	+	0	14½	13½	+	0	+	+
65 Mrs. W. ...	33	At home (clerk till 18 m. ago)	9 years	152	92	+	—	+	Less	0	—	+	0
66 Mrs. M. ...	56	At home	3 years	160	128	+	Less	+	+	+	—	+	—
67 Miss D. G. ...	22	Teacher and exams.	3 years	104	98	+	0	+	Less	+	0	+	+
68 Miss K. ...	20	Gymnast	1½ years	96	72	+	0	0	0	+	0	+	Less
69 Miss W. H. ...	25	Shop	3 years	120	104	+	0	15½	13½	Slight	Slight	+	Less
70 Miss J. B. ...	44	Artist	2 years	128	68	0	0	+	0	0	—	0	—
1913 71 Miss A. ...	31	Teacher, exams.	6 months	130	100	+	+	+	+	+	Slight	0	—
72 Mrs. E. ...	36	Teacher, then house	6 months	112	96	0	—	+	0	+	—	+	No teeth
73 Miss S. ...	38	Nil	—	104	92	0	—	14½	13½	+	0	+	+
74 Mrs. F. ...	74	At home	—	132	88	0	—	0	—	+	0	No teeth	teeth
75 Miss M. A. ...	26	Light house	6 years	92	80	0	—	+	Less	0	—	+	Less
76 Mrs. L. ...	46	At home	Some months	100	90	0	—	+	+	0	—	+	+
77 Miss E. A. ...	33	Farmhouse	9 months	144	124	0	—	+	+	+	+	+	+
78 Miss I. B. ...	22	Clerk	4 years	100	96	+	+	+	—	+	—	0	—
79 Miss H. ...	30	Nil	—	108	76	0	—	13½	13	—	—	0	0
80 Mrs. E. ...	44	House, book-keeping	3 years	128	120	0	—	+	+	+	Less	+	+
81 Mrs. R. ...	55	House, four children	Ill for years	160	100	0	—	+	Less	0	—	+	—
82 Mrs. F. ...	42	House	Worse, 3 years	100	80	0	—	+	+	0	—	+	Less
83 Mrs. L. ...	59	Nil	6 years	160	96	+	0	+	Less	+	+	0	0
84 Miss I. McC. ...	28	Teacher	6 months	88	96	+	0	0	0	+	+	+	+
85 Miss B. ...	45	Governess	4 months	90	84	0	—	+	—	0	—	+	—
86 Miss E. W. ...	17	G.P.O.	6 months	100	80	0	—	+	Less	0	0	+	0

TABLE II (continued)

General health	Number of X-ray treatments	Result at end of treatment	When last heard of	Notes
—	5	Somewhat better	—	Four epileptic fits since marriage (2 years)
Emaciated; very nervous, bedridden, heart dilated	38	Twenty treatments; a rest; then started work; marvellous recovery	1914: Wonderfully well; in India; going to be married. 1921: Much better; pulse 80; no goitre; 1 child	Family quarrels; surgeon declined to operate as hopeless; weight 5 st. 10 lb. to 8 st. 6 lb.
Frequent asthma, tired	14	Much stronger	1916: Munition worker, Woolwich	Asthma stopped after second treatment, and two teeth out
Old phthisis; mental once	30	Feeling very well	1914: Very well for a year, then died of acute mania	Lay up some months, then ordinary life; great home worries
Heart dilated, M.C., nervous	31	Much better	—	Husband (Swiss) very harsh; constant friction
Strong till pneumonia 3 years ago; now heart dilated	9	Nerves better, oedema gone; got thrombosis in arms; therefore X-rays stopped	1915: Died with tachycardia and paralysis	Lived too far away for efficient X-rays
Emotional	22	Improved; overworking	1914: Fatter	Goitre 10 years; work proved too heavy
Psoriasis, appendicitis	8	Better than for six months	1914: Working again; pulse 84	"Nervy"; home worries
Stridor; bed; very weak; heart dilated	54	After nine months much better than for years	1921: Working quietly 6 hours daily; pulse 70	1910, in Oxford Infirmary; 1911, in Warneford (mental); mother and five brothers and sisters have goitre
Diabetes, melancholia; B.N.O.	11	Much better; still gets tired	1919: Pulse rapid, 124; no other symptoms; more mental	1919: Family mental; took rest cure instead of further X-rays; head of rest home said, "Nothing helped her as your treatment did"
Very anæmic; cough	64	Better, but not strong	1921: Married; no goitre; pulse 84; not strong; telangiectasis; teaching again	Operation too dangerous; sister exophthalmic goitre, <i>see</i> 59
Depressed; constipation	6	Slight improvement	—	—
Several rest cures; irritable, goitre 10 years; many aches	11	Feeling much better	—	Gave up
Malignant carcinoma, breast removed 1899; rheumatism, constipation, gall-stones	25	Patient despondent, is stronger	1914: Daughter writes: "Much better, going on a visit; better than for years"	In bed about 3 months, or on couch
Overworked at school	6	Improved	—	—
Flabby, B.N.O.	9	—	1921: "Wonderfully better"; home duties; pulse 82	—
Rheumatism, quinsy	6	Feels stronger	—	Gave up; heart less dilated at end of treatment
Very tired; psoriasis	10	No improvement	—	Discharged, as would not follow treatment advised
Goitre seven years	8	Goitre less, much better	Two years later: Well except for goitre; married, and has a baby	—
Teeth filthy	11	Better for a time, then poisoned again with pyorrhœa	1921: Well; pulse 74 (after lymphoid compound)	—
Eczema, very irritable	18	Heart too overstrained to recover	September, 1915: Daughter says is much better. 1921: Housework, heart feeble; pulse 100	Eczema disappeared; dislikes gas, neighbours, maids, house, town, &c. Gained 6 lbs.
Goitre 24 years	5	Feeling very well	—	—
Gained weight	19	Improved; heart irregular	—	Heart very damaged; in nursing home; much constipated; constant tremor
Gained weight	15	Overworked at examinations	—	Vaccine for pyorrhœa
Nervous of health	8	Improved	—	General condition much better
T.A.; menstrual periods irregular	7	No symptoms	One year later, goitre; pulse 70; no symptoms	Too many examinations

Stoney: *Treatment of Graves' Disease*

TABLE II (continued).

Number and Name	Age	Occupation	Duration of illness before X-rays	Pulse		Exophthalmos		Goitre		Tremor		Oral sepsis	
				Before X-rays	After X-rays	Before	After	Before	After	Before	After	Before	After
87 Miss S. C.	48	Servant	1 year	146 irr.	200	0	—	in. Large	in. on left	0	—	0	—
88 Mrs. I. ...	40	House	10 years	136	120	+	+	+	+	+	Less	+	0
89 Miss E. L.	19	Pupil teacher	—	120	116	0	—	+	$\frac{3}{4}$ less	0	Slight	+	0
90 Miss D. ...	43	Attending classes	—	100	92	0	0	13 $\frac{1}{2}$	12 $\frac{1}{2}$	+	0	+	Less
91 Miss E. C.	40	Illustrating	3 years	156	120	+	—	12 $\frac{1}{2}$	12 $\frac{1}{2}$	+	Less	+	+
92 Miss E. R.	29	Teacher and exams.	14 years	112	112	+	0	13 $\frac{1}{2}$	12 $\frac{1}{2}$	+	0	0	—
93 Miss D. C.	27	Cashier	1 year	148	140	+	—	14	13 $\frac{1}{2}$	+	Less	+	Less
94 Miss E. J.	32	G.P.O.	1 year	136	120	+	—	+	Less	+	0	+	+
95 Miss M. C.	36	Maid	—	124	92	0	—	13 $\frac{1}{2}$	13 $\frac{1}{2}$	+	Less	+	+
96 Miss F. C.	17	Home work	—	112	108	0	—	15	—	+	—	+	—
97 Miss D. S.	16	School	Few months	112	90	0	—	14	13 $\frac{1}{2}$	0	—	+	+
98 Miss F. L.	19	Exams.	—	100	84	0	—	+	Less	+	0	+	Less
99 Miss P. ...	19	Training College	—	100	84	—	—	+	Less	+	0	0	0
100 Miss E. B.	19	Servant	5 months	96	80	+	+	+	Less	+	+	0	0
101 Mrs. P. ...	33	House, 3 children	5 years	144	84	0	0	+	0	+	+	+	0
102 Miss N. C.	21	Exams.	—	84	72	0	—	+	Less	+	0	+	+
103 Miss A. D.	19	Training College	—	116	116	0	—	+	Less	0	—	0	—
104 Mrs. M. ...	55	House, 3 children	3 years	130	120	0	—	+	Less	+	+	+	+
105 Miss C. M.	53	Nil now	1 year	132	140	—	—	+	+	+	0	No teeth	
106 Mrs. S. ...	44	House, 6 children	—	128	88	+	0	+	Less	+	Less	No teeth	
107 Miss R. W.	20	Savings Bank	1 year	116	80	+	More	+	More	+	More	+	—
108 Miss W. T.	15	School exams.	—	90	96	0	—	+	0	0	—	+	+
109 Miss M. C.	53	Factory and house	9 years	160	104	0	—	14	13 $\frac{1}{2}$	0	—	+	0
110 Miss G. M.	17	Training College	—	104	80	0	—	+	Less	+	Less	0	—
111 Miss E. ...	29	House	6 years	68	84	Trace	0	+	Less	0	—	+	Less
112 Mrs. D. ...	38	House, 4 children	1 $\frac{1}{2}$ years	96	88	+	—	+	+	+	+	+	+
113 Miss E. G.	21	Training College	—	120	108	—	—	+	—	0	—	+	—
114 Mrs. D. ...	53	House, nursing mother	—	120	120	+	Less	+	—	+	+	+	—

TABLE II (continued).

General health	Number of X-ray treatments	Result of end of treatment	When last heard of	Notes
Only sent to hospital when dying of heart failure	3	Hopeless when admitted, died five weeks after	—	August, 1912, hemi-thyroidectomy; symptoms recurred quickly
Very tired; thin	8 m.	Some improvement	1914: Pregnant, gets tired. 1921: very well, works hard; pulse 86	Malnutrition; three children; became less nervous
Headaches	6 m.	Feels quite well	1921: Pulse 82; very well; teaching ever since	Goitre since birth; overworked for examinations
Wasted, nervous, tonsillitis	16	Well	—	Discharged fatter, not shaky at end, less nervous, overworking
Overworked, nervous, hysterical	31	Distinct improvement	1914: Working, better in general health, telangiectasis	Pulse 88, after 18 treatments; next year symptoms recurred, with financial strain, overwork and pyorrhœa
Overworking, gets tired	24	Nutrition better	1916: Working hard, is well, except for rapid pulse (120), telangiectasis. 1921: Pulse 80, working	Mental overstrain, teaching and failing at examinations for last 10 years; still overworking
Says pulse 88 at home	10	Better	1913: Gone to seaside	Gave up too soon
"Nervy," feet swell	14	Better, feet do not swell	1913: Working, relapsed, cured by operation	Gave up too soon; working; goitre became soft
Bronchocele 20 years, nervous, anæmic, overworked	15	Great improvement	1914: Much better, working; 1921: Much better after X-rays	Discharged
Rheumatism, menstrual periods irregular, adenoids, feeble	4	Better	—	Very anæmic, needs more treatment
Adenoids	5	Improved	1914: Still symptoms	Gave up
"Petit mal" since 15, once a month	15	Perfectly well	—	Discharged; fits stopped completely after three treatments
Anæmia	7	Perfectly well	1921: Quite well, pulse 62; married, teaching, working hard	Discharged, no symptoms
Amenorrhœa 5 months; T.A.	10	Feeling all right	—	Menstrual periods regular after one treatment
Emotional, ankles swell	14	Good, fatter, quiet	1921: House; pulse 80; "X-rays the most wonderful treatment"	Much better after third treatment
Jerky, excitable	8	Good	1921: Well, teaching ever since; pulse 80, exophthalmos slight, no goitre	—
Pulse very irregular, indigestion	18	Unsatisfactory	Overworking	Bronchocele 2 years; mental work too heavy
Indigestion, menopause 3 years ago	9	Better, less shaky	—	Goitre since childhood
Bad rheumatism, B.N.O., thin	17	Feels much better, put on 14lb.	—	Less nervous; in bed 1 month; surgeon declined to operate
Starved, indigestion	16	Fatter, feels much better	1921: House; gets exhausted; pulse 104	Menopause during treatment; goitre 8 years
—	—	Unsatisfactory	1921: Quite well; pulse 80, no goitre, exophthalmos slight; married, one child	Gave up; work too hard
Adenoids removed at 6	9	Unsatisfactory	1915: Feels quite well, slight goitre; pulse 100	Oral sepsis bad
Atrophic scirrhus	15	Better, stronger	Died of heart failure 6 months later	Great home worries, could not rest
—	11	Good	—	Goitre since 11
Emotional, terrified	5	Much better	1917: Very well ever since	Teeth, and bad home circumstances caused illness
Overworked	26	Discharged, better	Two months later feeling better, doing more work. 1921: Better, pulse 76; rests; housework	—
Taking examinations	8	Better	One year later teaching, feels well; pulse 120	—
Weight going up	9	Feeling much better	—	Gave up

TABLE II (continued).

Number and Name	Age	Occupation	Duration of illness before X-rays	Pulse		Exophthalmos		Goitre		Tremor		Oral sepsis	
				Before X-rays	After X-rays	Before	After	Before	After	Before	After	Before	After
115 Miss M. D.	16	Student	2 years	112	96	0	—	in. +	in. +	0	0	+	Less
116 Mrs. S. ...	21	House, baby	1 year	144	124	Slight	0	+	—	+	+	+	+
117 Miss le G.	26	Teacher	9 years	100	84	0	—	+	Less	+	Less	+	—
118 Miss H. D.	20	Student	6 months	100	72	0	—	+	—	0	0	+	0
119 Miss E. S.	42	Nil	1 month	104	88	0	—	+	—	+	—	+	—
120 Mrs. L. ...	40	In business	—	116	84	0	—	+	—	+	0	+	0
121 Mrs. S. W.	49	At home	3 years	96	88	+	—	11½	13	+	0	++	—
122 Mrs. L. ...	40	At home	—	88	—	—	—	+	—	0	—	+	—
123 Mrs. H. ...	51	House and parish	Long time	116	88	+	+	14	12	+	+	+	0
124 Mrs. L. ...	33	House	Over 3 years	100	86	0	—	14½	13½	+	0	0	—
125 Miss A. R.	53	House-keeper	1 year	88	80	0	—	+	0	+	0	+	Less
126 Miss S. ...	23	Musician	1 year	140	120	+	+	+	+	+	+	+	—
127 Pte. C. ...	22	Soldier	—	136	78	0	—	Slight 13½	Slight 12½	+	0	0	—
128 Pte. H. ...	25	Traveller and soldier	6 months	100	80	0	0	13½	12½	+	0	+	Less
129 Mrs. K. ...	42	House	9 months	136	84	+	0	+	+	+	0	+	Less
130 Pte. L. ...	23	Soldier	2 months	156	68	0	0	0	0	+	0	++	0
131 Mrs. T. ...	49	House	—	100	80	0	—	+	2 less	—	—	0	0
132 Pte. K. ...	36	Soldier	—	100	84	+	—	+	—	+	—	+	+
133 Mrs. M. ...	50	Companion	3 years	104	90	0	—	+	+	—	—	No teeth	teeth
134 Miss M. ...	33	Light house	—	140	96	0	—	+	Less	+	—	++	+
135 Miss P. ...	23	Machinist	—	104	100	+	—	0	—	+	—	+	—
136 Pte. W. T.	25	A.S.C., M.T.	—	92	74	0	—	+	0	+	0	+	Less
137 Pte. E. ...	27	Soldier	2 months	108	84	0	—	+	0	+	0	+	—
138 Mr. H. ...	29	A.S.C.	18 months	152	100	+	Less	+	Less	+	0	0	0
139 Mr. V. ...	36	School-master	2 years	112	80	+	Less	+	0	+	0	+	+
140 Miss L. ...	36	House	2 years	124	100	+	Less	0	—	0	—	++	No teeth
141 Miss L. ...	24	Bank	Some years	108	80	0	—	+	Less	+	0	0	—
142 Miss A. H.	41	Nil	6 months	92	88	0	—	0	—	+	0	+	—
143 Miss M. ...	28	Rescue work	6 months	84	72	0	0	+	Less	+	0	Slight	—

TABLE II (continued).

General health	Number of X-ray treatments	Result at end of treatment	When last heard of	Notes
Menstrual periods irregular, ad. catarrh	11	Very well	1921: Quite well; telangiectasis; dispenser	—
Emotional, nursing 7 months	6	Improved	—	Gave up too soon
Myope, loss of memory	6	Much better, working hard, getting fat	—	Mother morbus cordis; brother spendthrift; both drag on her
Myope, anaemia, overworking for examinations	18	Better	1921: House surgeon—gets very tired; pulse 90, slight tremor, not so nervous; "on the whole, the thing has left me; I do you credit"	Father nervous breakdown; one brother killed, one epileptic
Tired always, indigestion	12	Better	1920: Very well if she goes quietly	Abscess under wisdom tooth; better when this taken out
Husband died of phthisis, always rushes	6	Much better, does not feel heart	—	Slight dermatitis
Very nervous, always frightened	4	Fatter (thence neck measurement larger)	Six months later died, with myxodema and mental	Fibroid operation 5 years ago
Retroversion, nervous, irritable	3	Better	Nine months later "very much better since X-rays, bright, almost lost weight"	Mother had exophthalmic goitre
Overworked, hemorrhoids, gallstones	20	Better, legs do not swell	Two months later: beginning work again	Home very difficult; great improvement but symptoms still
Always goitre, heart dilated	14	Heart normal size, much better—tires	1921: Very well till influenza; pulse 98	Two aunts Graves' disease; mother myxodema
B.N.O. dyspnoea, menopause at 32	5	Cure	—	Dilatation of heart cured; "you have been a godsend to me"
Gonorrhoea 1914, masturbates	14	Not much better	Still ill	Gave up
Terribly nervous	6	Excellent	Checking clerk to A.S.C.	Very rapid improvement
Neurasthenia (calcified cartilages)	10	Cured	Applied for a commission; playing centre football	"Felt better than before Neuve Chapelle; all his aches gone"
Thin, weak, nervous	27	Recovery	1921: Keeping fairly well; pulse 60; housework	Is a grandmother; husband out of work
Gunshot wound buttock, dying of heart failure	17	"A resurrection"	Coal miner in Scotland	Desperately ill till month cleared and X-rays begun
Large goitre many years	40	Perfectly well	—	Slow case, but done very well, commencing menopause
Abrupt, some shell-shock	12	Better	Quieter, less nervous, pulse 88, well except for headache	To get teeth settled; sent for deafness but none found
Very eccentric	13	Better	Felt much stronger	Heart irregular and giving way; very poor, has to work
Amenorrhoea	24	Gain in weight, menstrual periods returned	Felt better	Discharged till month settled
Very nervous	3	—	1918: Breakdown. 1921: Doing light clerking; pulse 74, variable	Gave up too soon
Deaf, "fair run down," very nervous	6	No symptoms, cure	—	Said "X-rays like a dose of sunshine"
Jaundice and heart trouble	14	Very well, except dyspnoea	One year later, in India with his regiment; keeping well	Nervous many years
Before the war perfectly well, a collier	19	Improved for a time	1918: Very breathless, had haemoptysis	Wife died of phthisis
Breathless, exhausted	12	Cure	1921: Teaching, never gets tired, pulse 62	Overstrained, with Egyptian army
Very feeble	18	Much better, still feeble	Slight symptoms still, working. 1921: Always tired, chronic appendicitis, pulse 120	Malnutrition, neurasthenic
Tired easily	9	Feels much better, neck smaller	Going on well; 1921: Married, one child, much better	Engaged to an officer (during the war), hence war strain
Never strong, nervous	8	Much better	—	—
R.F. morbus cordis	7	Much better, no oedema now	1921: Gardener to a school; pulse 68; "better than ever in my life"	Much less nervous, has to go carefully

Stoney: *Treatment of Graves' Disease*

TABLE II (continued).

Number and Name	Age	Occupation	Duration of illness before X-rays	Pulse		Exophthalmos		Goitre		Tremor		Oral sepsis	
				Before X-rays	After X-rays	Before	After	Before	After	Before	After	Before	After
141 Mrs. A. ...	48	Teaching	—	100	80	0	—	0	—	+	Less	+	0
145 Miss C. ...	45	Gymnast	5 years	108	80	0	—	+	—	+	0	0	—
146 Miss T. Y.	51	Head-mistress	1 year	104	67	+	0	+	0	0	—	+	—
147 Mrs. S. ...	41	At home	2 years	108	92	+	Less	+	Less	+	0	+	Less
148 Miss M. ...	40	Office	13 years	124	104	0	—	+	Less	0	—	0	—
149 Miss H. ...	29	Teacher	Some years	116	80	+	—	+	+	+	0	+	—
150 Mrs. B. ...	27	House (5 ch.)	14 months	88	84	0	—	+	Less	0	—	+	—
151 Dr. B. ...	34	Doctor	1 year	84	68	0	—	+	+	+	0	0	—
152 Mrs. S. ...	45	R.A.M.C. Nil	1 year	112	110	0	—	+	0	+	0	0	—
153 Mr. G. ...	32	Writer	7 years	112	88	Slight	—	0	—	0	—	0	—
154 Mrs. K. ...	29	House-work	3 years	112	112	+	Less	+	+	+	Less	+	+
155 Mrs. P. ...	53	House	—	120	88	Slight	—	0	—	0	—	+	+
156 Nurse S. ...	20	Nurse	1½ years	92	80	0	—	Slight	0	0	—	0	—
157 Mrs. B. ...	42	House	6 months	128	80	0	—	+	+	+	+	+	+
158 Miss V. B.	48	St. Dunstan's	5 months	108	96	+	Less	+	Less	+	0	+	No teeth
1917													
159 Miss N. L.	43	Music	Years	140	120	0	—	0	—	0	—	+	—
160 Mrs. C. ...	43	Home	5 years	96	80	0	—	+	Less	+	+	Plates	—
161 Mrs. P. B.	68	Home	—	120	96	0	—	+	Less	+	+	+	—
162 Mrs. T. ...	52	Home (8 ch.)	—	130	100	0	—	Slight	+	+	—	0	—
163 Mrs. H. ...	26	Typing	—	112	88	0	—	+	Less	+	0	+	0
164 Miss N. S.	22	At crèche	8 years	132	96	+	Less	+	Less	+	0	+	—
165 Miss H. ...	26	Teacher	8 months	88	72	0	—	+	Less	+	0	0	—
166 Nurse C. ...	32	Nurse	3 months	100	81	+	Slight	+	0	+	0	0	—
167 Pte. M. ...	31	Soldier	1 year	128	90	+	Less	+	0	+	0	+	+
168 Pte. O'B. ...	30	Soldier	2 years	124	96	+	+	+	0	+	0	++	Less
1918													
169 Pte. B. ...	40	Pensioner	5 months	112	96	+	0	+	0	+	+	+	Less
170 Mrs. A. P.	27	House-maid	4 years	128	80	0	—	+	Less	+	0	+	0
171 Miss V. ...	19	Secretary	6 months	100	84	0	—	0	—	+	0	0	—
172 Miss S. ...	35	Teacher	1 year	100	100	+	0	+	Trace	+	0	+	Less
173 Miss H. J.	26	Nil	2 years	100	96	0	—	+	Less	0	—	0	—

TABLE II (continued).

General health	Number of X-ray treatments	Result at end of treatment	When last heard of	Notes
Overworked, nervous	3	Somewhat better	—	Lost only son in the war
Nervous, thin	4	Slight improvement	—	Calcified rib cartilages
Menopause six months ago, thin, worries	20	Cure	1921: Pulse 65, steady; working 8.30 to 7.30 daily; exceedingly well	Very good result, working hard all the time
Hysterectomy, Appendicectomy	11	Improved, nerves much better	1921: In Penang; pulse 80, no goitre, ordinary quiet life	Malnutrition
Bad tempered, frail	9	Better, but required more treatment	Doing fairly well, working; 1921: Some heart failure, pulse irregular, scarred	Compensation failing
Depressed, emotional	13	Improved	1921: Much better, pulse 68; teaching	Nervous breakdown through overstudy, mental family history
Suckling	4	Feeling a lot better	—	Bronchocele slightly degenerated; husband a soldier
Exhausted, nervous	10	Better, working hard	1921: Recurred 1920, cured by suprarenal	Rest cure useless before X-rays
Thin, worries; husband in Mesopotamia	20	Slight improvement	Four years later died	Cardiac failure prominent all through
Tired out, depressed	12	Much the same	Thinks he "had an interval of feeling a whole lot better"	Mentally exhausted with overwork
Compensation failing, thin, nervous	16	Feels better, no oedema, less nervous	Four years later: Pulse 108, symptoms still, working	Told must get teeth settled; upset by air raids
Bronchitis and asthma for years	4	Some improvement	—	Upset by air raids
T.A.: rheumatism	4	Quite well	Can walk 7 miles, no symptoms	Excellent result, early case
Anemic, worried; husband drinks	6	Much better	Anemic, pulse 90, otherwise well	Oral sepsis still
Nervous, excitable; ovaries removed March, 1916	20	Very great improvement	1920: Perfectly well, working, strong	Long case, but excellent result
Very feeble	8	Distinctly better	1921: Casual teaching, pulse very irregular, far from strong	Heart badly overstrained
Irritability, breathless	12	Distinctly better, too energetic still	1921: India, practically cured, pulse 93, well, but tires easily	War strain
Very thin, fidgety	8	Less nervous, is stronger	November, 1917: Does not get on much	Having further X-rays elsewhere
Overstrained, colitis	6	No better; dermatitis; not enough X-rays	Mental	War strain, two sons killed; husband paralysed 3 years
Nerves, jerky	5	Very good, feels quite well	1918: Well, pulse 76, no symptoms	Slight case, done well; war strain
Feeble, nervous, excitable	20	Excellent recovery	1921: Very well, working on farm; "I feel better than ever"; no goitre, no nerves	1918: Blown up by bomb, did not injure her
Losing weight; tires easily; nervous	24	Better, anemic	1921: Keeps well, taking classes	Overworked, war strain; family history of goitre
Thin, nervous, jerky, uterine trouble	30	Better, not strong	1920: Pulse 84, exophthalmos a trace, otherwise well	Working one year (1920)
Malaria in Mesopotamia; dazed	13	Feels "a lot better"	1918: "I am getting stronger again now"	Began with malaria and war strain
Very nervous	22	Great improvement	1919: Coster, married; "Quite well," not nervous; oral sepsis less	Dental trouble serious, but anaesthetist refused to give chloroform
Very weak, getting thin	22	Much stronger	Setting up a pie shop; 1920: Died of "uremia and heart failure"	Due to war strain: Loos, Ypres
Indigestion, emotional, nervous	15	Cure	Joined the W.A.A.C.s, continues well	Husband missing since August, 1917. War strain
Appendicitis, dysmenorrhœa	12	Some improvement	Having operation for appendicitis; 1921: "Cured by Christian Science"	Overworked; mother in asylum
Irritable, overworked	7	Much better on the whole	1920: Neurasthenic still, pulse 82, gained 1 st.	Working steadily; gets rather tired (1920), overstrained with war work
Poor physique, nervous	9	Not much improvement	—	Unsatisfactory; scoliosis; smokes too much

TABLE II (continued).

Number and Name	Age	Occupation	Duration of illness before X-rays	Pulse		Exophthalmos		Goitre		Tremor		Oral sepsis	
				Before X-rays	After X-rays	Before	After	Before	After	Before	After	Before	After
174 Mrs. E. ...	29	Married (2 children)	2 months	134	88	Slight	—	+	Less	0	—	—	—
175 Miss S. ...	36	Governess	9 months	120	84	0	—	+	Less	+	0	+	0
176 Miss K. ...	33	Lady's maid	Years	120	92	0	—	+	0	+	0	0	Plates
177 Miss H. ...	40	Teacher	10 years	88	80	+	0	+	+	+	0	+	Less
178 Miss H. ...	23	Student	A few months	92	80	0	—	+	—	—	—	+	—
179 Mrs. D. ...	31	House	1 year	144	108	+	Less	+	Less	+	—	+	0
180 Mrs. H. ...	54	House—Parish	5 years	120	72	+	—	0	—	0	—	+	—
181 Pte. C. ...	29	R.A.F.	3 years	108	80	+	0	Slight	Slight	0	0	+	+
182 Mrs. M. ...	32	Home	3 months	100	72	0	—	+	Less	0	—	+	Slight
1920													
183 Miss D. E. ...	41	Teacher	3 years	100	88	0	—	Slight	Slight	0	—	+	Less
184 Miss A. W. ...	45	Nurse	6 months	138	100	+	—	+	—	+	—	Slight	—
185 Mr. W. ...	31	Merchant	1 year	132	100	+	+	+	+	+	+	0	—
186 Mrs. M. ...	50	Home	8 years	140	112	+	+	+	+	—	—	++	+
187 Miss J. ...	64	Nil	6 months	112	—	0	—	—	—	—	—	+	+
188 Mrs. B. ...	38	House	10 years	108	84	+	Trace	Trace	0	+	0	+	Less
189 Miss G. ...	45	House	1 year	100	92	0	—	0	—	+	0	+	No teeth
190 Mrs. S. ...	39	House	2 months	92	100	+	0	0	—	+	0	+	Less
191 Miss T. ...	24	V.A.D.	3 years	124	92	Slight	0	Trace	0	0	0	0	0
192 Miss S. ...	27	V.A.D.	1½ years	132	96	+	0	+	Less	+	0	0	0
193 Miss L. ...	46	Governess	18 months	136	92	Slight	0	0	0	0	0	0	0
194 Mrs. M. ...	53	House	1 year	160	124	+	0	Slight	0	+	+	+	No teeth
195 Miss M. ...	35	Teacher	1 year	168	88	0	0	+	—	0	—	++	No teeth
196 Miss J. ...	42	V.A.D. teacher	2 years	124	96	0	0	Slight	0	+	Slight	No teeth	No teeth
197 Miss C. ...	52	At home	2½ years	124	112	0	0	+	+	+	+	No teeth	No teeth
198 Miss P. ...	39	Writer	3 years	100	120	0	0	0	0	+	+	+	Less
199 Mrs. D. ...	36	Chicken-ranch	2 years	100	84	0	0	0	0	0	0	No teeth	No teeth
200 Mrs. M. ...	40	At home	4 years	80	84	+	+	+	+	0	0	+	+

15 Men, all soldiers

185 Women—73 married, 112 unmarried

TABLE II (continued).

General Health	Number of X-ray Treatments	Result at end of Treatment	When last heard of	Notes
Misarrriage; too rapid child bearing	5	Feeling much better	Feeling wonderfully better	—
Nervous, easily upset	7	Tires easily, otherwise well	1920: "Feel a different being," enjoys her work	War strain
Overwork and worry	17	Improved, not strong	1921: Can do a little work	Goitre began at age of 14; sister also goitre, brother killed in war
Overworked, excitable	6	Slightly excitable, dyspnoea, otherwise quite well	1921: Working steadily, pulse 75	Air raids, overstrained at home
Nervous, depressed, suicidal, very tired	4	Much better, brighter	Well and bright after a holiday; 1921: Overworking for degree, pulse 95	Never had a good holiday before for 10 years
Pregnant, acute Graves'	10	Improved, continuing treatment	1921: Ever so much better, slight symptoms, still under treatment	Done very well; leading ordinary life
Frail, nervous, overworked	6	Quieter, feeling better	1920: Pulse 84, still jerky, health much better	Mouth probably septic still; bridge work
Intensely nervous, terrified	12	Greatly improved, slightly nervous	As well as before he joined the Army	Discharged V.D.H., June, 1916; re-enlisted September, 1918
Restless, nervous	6	Better and quieter	1921: Physically well, restless and depressed still: "I feel same now, I don't think I did when I came to you"	Married, 1914; separated from husband next year
Depressed, fibroid, nervous	18	Feeling much better	1920: Gets tired, but has been working very hard	Finds her work rather too heavy
Thin, exhausted; has kept working	10	Improved	Gone into hospital for further X-rays	Should do well after more treatment
Psoriasis, otorrhoea, nervous	22	Better, putting on weight	1920: Gained 13 lbs., no goitre, pulse 90, fit and well; 1921: Very much better, pulse 80-90	Severe case, due to war strain abroad; due to otorrhoea?
Phthisis and pleurisy, emaciated	9	Distinct improvement	Gave up because of increasing chest trouble	Oral sepsis severe, though under many doctors
Seriously ill, influenza, November, 1919	3	Taken off X-rays by her doctor as too ill	Died 2 months later	Treated medically too long; more X-rays might possibly have saved her
Thin, nervous, uterine trouble	40	Feeling better, gaining weight, can do more	Better than for some years	Air raids; domestic worries
Acne, nervous, worries, breathless	10	Cure	1921: pulse 84, no symptoms, working hard	Overworked with war ambulance; early case, done very well; acne also cured
Overstrained, very nervous, thin	6	Nearly well	1920: In China, gaining weight	Got less strained, less emotional; mother has cancer
No energy, feels heart, rheumatic fever	19	Slow, but improving	Still under treatment	V.A.D., overworked; mother dying of cancer, father drinks, brother killed
Gastric ulcer March 1919, appendicitis operation 1912, mental 1919	24	Great improvement	Gaining weight, married, pregnant	Gave up before complete cure; was doing very well
Typhoid and tapeworm 1916, ill-nourished and excitable	22	Feeling much better	Still under treatment, overworking	Heart more regular, quieter, sleeping better
Extremely nervous	20	Very much better, getting stout, hardly nervous	Still under treatment	Daughter has Graves' disease; one son, soldier, another killed in war
Otorrhoea, nervous, heart dilated, polypi in nose	23	Much better	—	Will probably need more treatment
Anemia, inert V.D.H.	19	Somewhat better, feeble	Still off work	Prisoner 2 months in Germany
Weak, very nervous; menopause one year	11	Gaining weight, pulse still irregular	Still under treatment, less tired	Had some X-rays elsewhere; needs more treatment
Eyes very troublesome, cannot read	5	Better and stronger	Still under treatment	Had to give up her work because of her eyesight
Emotional, worries, eye symptoms, heart feeble	7	Improving	Still under treatment	Oral sepsis till a few months ago
Nervous, worried	6	Stronger, less worried, feels much better	—	Started when nursing only child

Dr. J. M. H. CAMPBELL,

discussing the prognosis of Graves' disease, and the relative prognosis after operative and non-operative treatment, said that ten years ago Sir William Hale-White tried to trace all those who had been in Guy's hospital with Graves' disease between 1888 and 1907. As a result of the study of these cases and of other cases seen privately he (Sir William Hale-White) had reached certain conclusions as to their prognosis which he had stated in the discussion. During the last ten years the operative treatment had been more frequently adopted, and it had seemed to him (Dr. Campbell) worth while to make a similar study of the cases in Guy's Hospital during the years 1908-17.

The two points he wished to speak of were, first, the prognosis for a patient with Graves' disease sufficiently severe to require admission to hospital, and secondly the relative results under operative and non-operative treatment, so as to provide some further data which would be helpful in deciding whether to recommend operation in any particular case. Everyone was agreed that there was generally great improvement in most of the symptoms and signs after partial thyroidectomy. There were not so many data available for forming an opinion of the ultimate prognosis.

During these ten years there were reports available of 127 cases. He had traced over 70 per cent. (89) of these cases until their death, or for varying periods of four to twelve years. Twenty-six of these had been good enough to come and see him at the hospital; a few others he had seen at their homes, or in two instances at asylums; while the others had written to him from nearly all parts of the world, and he had often received very full and helpful reports from their doctors as well. He was much indebted for all this help, without which this study would have been impossible, and he also thanked the physicians and surgeons of Guy's Hospital for allowing him to refer to cases who had been under their care.

Of the 127 cases eight had died in hospital of Graves' disease, or of terminal infections such as pneumonia while they were acutely ill with Graves' disease; and one had died in hospital with carcinoma of the pancreas. Of the eighty who had been traced after they had been discharged from hospital seven died of exophthalmic goitre and five had died of other diseases—appendicitis, perforated gastric ulcer, pneumonia during the influenza epidemic, and two of heart disease of many years' standing, which had been thought to be independent of the condition they were considering.

In deciding on the general prognosis, the cases which could not be traced must be taken into account, as otherwise the deaths in hospital would give an unduly grave prognosis. The cases which had been lost sight of were mostly in hospital during 1908-09-10. He could see no reason for supposing that these cases differed fundamentally from the others. He had thought it fairest to assume that the results among the thirty-eight who could not be traced were the same as among the eighty who could be traced.

In considering the prognosis he had divided the cases into five groups:—

(I) Those who had been completely cured (i.e., who complained of no symptom of ill health, and on examination by their private doctor or by himself revealed no single sign of Graves' disease). This group included seven cases, five of whom had had severe attacks (8 per cent.).

(II) Those who had been almost cured (i.e., who were able to lead a normal life, earning their own living if necessary, but showed one or occasionally two

signs persisting to a slight degree). This group included twenty-six cases (30 per cent.).

(III) Those who had been much improved (i.e., who were able to do light work at home or actually earn their living by light work, but were not restored to complete health, and showed obvious persistent signs of the disease). This group included twenty-nine cases (33 per cent.).

(IV) Those who had been little or not at all improved. This group included eleven cases (13 per cent.).

(V) Those who had died of Graves' disease. This included eight who had died in hospital and seven who had died after discharge (15 per cent.).

These results could be most clearly expressed in tabular form :—

TABLE I.

	Died in hospital	Traced	Not traced	Total	Percentage
(I) Cured ...	—	7	(3½)	10½	8
(II) Almost cured ...	—	26	(12)	38	30
(III) Much improved ...	—	29	(13½)	42½	34
(IV) Not improved ...	—	11	(5½)	16½	13
(V) Died ...	8	7	(3½)	18½	15
Total ...	8	80	38	126	100

(In compiling Table I it had been assumed that the results among the thirty-eight cases who were not traced were proportional to those among the eighty cases who were traced. One case who had died in hospital of carcinoma of the pancreas had been omitted. The five cases who had died of other diseases after discharge were included in the group which the general condition previous to their final illness warranted—in every case Group III or IV.)

In considering the relative results of medical and surgical treatment there was no need to make any assumption about the patients who could not be traced. He had excluded the five patients who died within a year or sometimes within a few months of the onset of their illness, because he did not think most surgeons would have operated on them. Two of the other cases who had died had been seen by surgeons who did not regard them as suitable for operation, but he had included them as deaths under medical treatment because they had lived four and six years respectively and there had been probably some period when an operation was quite feasible.

Of the two cases who had died after surgical treatment both had been seen by surgeons who decided against a second operation. The results were again most clearly expressed in tabular form, making use of the same groups :—

TABLE II.

	After partial thyroidectomy (16 cases)	After medical treatment (56 cases)
(I) and (II) Cured or almost cured ...	38 per cent.	41 per cent.
(III) Much improved ...	38 "	28 "
(IV) Not improved ...	12 "	17 "
(V) Died ...	12 "	14 "

The results were too few for him to be able to draw very definite conclusions from them, but they certainly suggested that the results of partial thyroidectomy were not always so much better that they ought to neglect the danger of operation and advise operation in every case.

If Graves' disease were due to hypersecretion of thyroid substance in

response to general changes in the endocrine system of the body, one might expect that the body would respond to partial thyroidectomy by a compensatory hypertrophy of the thyroid. If that were so, it might well be one reason why a second operation was sometimes needed, and why the late results of operation were not so satisfactory as the immediate results.

MR. W. H. C. ROMANIS

said that he would discuss three aspects of this question, namely, the selection of cases suitable for operation, the nature of the operation to be done, and the results to be expected from it. He endorsed what Mr. Berry had said when he stated that it was not unusual to find that many cases were by some observers named Graves' disease when to his mind their symptoms and physical signs were not sufficiently pronounced to merit that application. It was not unusual to find adenomata of the thyroid, parenchymatous goitres and occasionally even malignant thyroids, exhibiting palpitation, nervousness, rapid pulse or tremor, but he (Mr. Romanis) did not regard these cases as cases of Graves' disease, and thought that the name should only be applied to those patients who, in addition to the foregoing symptoms, had a noticeable amount of change in their eyes and definite cardiac enlargement.

(1) In deciding whether such a case was likely to benefit by operation, they must consider at the commencement whether the milder cases should not undergo a course of medical treatment first. If all the signs and symptoms were slight and were not progressing, and had only been in existence for a few months, medical treatment might often be followed by considerable benefit, though the improvement was frequently only of a temporary character. On the other hand, in moderately severe cases or in cases in which one sign or symptom was present to a marked degree and progressing, medical treatment could not take the place of operation, though it was of great use as a preparation for surgical treatment; it should not, in this case, be continued for more than two or three months, for by submitting to operation reasonably early the patient would be saved much time and disability, and a better result in the end was likely to be obtained. Unfortunately, in a great many cases, the question of operation was not raised in the early stages, and it was only considered when the case had become so severe that the risk of the operation had to be taken into account and balanced against the benefits that might follow its performance, though they must remember that, when dealing with a disease of so serious a character, it was justifiable to run a small amount of risk in an attempt to obtain a cure. As regarded individual signs and symptoms, he did not consider great rapidity of pulse-rate, irregularity of the pulse, marked cardiac dilatation, or fibrillation, or the presence of acetone in the urine, of diarrhoea or vomiting, or serious loss of weight, as in any way contra-indicating operation, provided the patient was anxious to have the operation done, and provided her mental condition was moderately good. Nervous and emotional excitability was of course always present, and even though very marked it did not constitute by itself a bar to operation, but if mental symptoms of a melancholic, delusional, or maniacal type were present he did not think that operation held out a reasonable prospect of improvement, and in fact it might possibly make the patient's condition worse than before. Associated conditions such as an age above 60, the presence of diabetes, great fear or unwillingness to undergo the operation, the presence of oedema due to a failing

heart, entirely contra-indicated operative treatment. Operation should not, as a rule, be urged in cases in which the patients were very unwilling to undergo it, as they did not appear to be improved by it to nearly the same extent as those who were anxious to have it done. But it was surprising that these nervous and hypersensitive patients were nearly always anxious to undergo operative treatment when it was suggested to them, and this was especially noticeable in the severe cases.

(2) As to the nature of the operation to be performed, removal of large portions of the thyroid gland was, he thought, the procedure of choice. They did not, at present, know the primary cause of the disease—that cause which led to enlargement of the thyroid. It might very probably be an infection, but of that they had no proof; they had, however, evidence that the enlarged thyroid gland was the factory in which the symptoms were produced, and by reducing its activity they could relieve the symptoms and render the patient a normal individual. It was not sufficient to remove half the gland—one lobe, the isthmus, and at least a quarter of the other lobe was the minimum amount that should be excised. Hemi-thyroidectomy would produce an improvement, but it was not the best that could be done, and it would hardly ever completely relieve the symptoms. He could not help thinking that it was important not to leave behind small portions of the lobe which was being removed, attached to the recurrent laryngeal nerve or to the superior thyroid artery; whilst it was by no means uncommon to find a tongue-shaped process passing behind the larynx, which should also be removed. If these little pieces were left behind, they certainly could and did undergo hypertrophy and did grow later on, and it was very possible that they were the cause of persistence of symptoms or of subsequent relapse. Though the milder cases could be safely operated upon under open ether anæsthesia or rectal ether, the severe cases would be subjected to a considerably smaller risk if the operation were done under a local anæsthetic, as was first practised extensively by Mr. Dunhill. Anxiety and fright, one of the objections to this procedure, would not be present if morphia and hyoscine were administered to the patient beforehand, and if this was done 90 per cent. of the patients declared afterwards that they had no recollection of the operation at all, though during it they might have shouted, talked, or cried. Many patients, especially women, when told that the operation could be done for them under either local or general anæsthesia, voluntarily selected the local method in preference to ether. In severe cases it might not be desirable or possible to remove as much thyroid tissue as one would wish at first, and in these cases a second or even a third operation might be done later on.

(3) What were they to expect as a result of this operation? One of the most encouraging features of this branch of surgery was the fact that those patients who had had a severe form of the disease before operation appeared to obtain even greater relative benefit and to be more pleased with their improvement after the operation than patients in the slighter cases. Let them first consider the mortality, for though mortality was not everything, it was the first thing probably about which the patient would inquire. Out of about 220 cases of thyroidectomy for this condition five had succumbed, this giving a mortality of $2\frac{1}{2}$ per cent. These patients were of all types of severity, many with pulse-rates of over 180. As a rule there appeared, as a result of thyroidectomy, to be more improvement in subjective symptoms than in physical signs. As Mr. Berry had already said, it was often remarkable that the patients looked better and felt much better within a day or two after the operation,

but it was, on the other hand, frequently not for several weeks that marked improvement in the physical signs commenced. As a rule, after four months, patients who had had an adequate amount of thyroid tissue removed, felt quite well, ate well, slept well, and could do their day's work. They put on weight, but on examination it was found, usually, that the pulse-rate, though considerably slower than it had been, had not come down quite to its normal. The cardiac dilatation, though very much less, had not quite disappeared. Irregularity of pulse, diarrhoea and vomiting, acetonuria, if previously present, almost invariably disappeared, but the eyes, though considerably less prominent than before, rarely returned completely to the normal. It might be thought that if still more of the thyroid tissue had been removed these physical signs would be improved even further, but he did not think it was likely, for though a second operation for further removal of thyroid tissue was often worth while if the subjective symptoms had not entirely disappeared, it did not, as a rule, effect very much further improvement in the eyes and pulse-rate. In the few cases in which he had deliberately removed the whole thyroid gland for this condition, the physical signs had never, so far, completely disappeared.

In conclusion, he asked, were not the parathyroids a physiological myth? Did they really exist as functioning organs? Mr. Berry had told them that he had never seen any symptoms after operation that appeared to be due to interference with the parathyroids, nor had he (Mr. Romanis); and he had not, so far, met any surgeon who had. After complete removal of the thyroid gland for malignant disease or for Graves' disease, after second and third operations for further removal of thyroid tissue, all done without paying the slightest attention to the parathyroids, no symptoms of parathyroid insufficiency appeared to have arisen, and he was tempted to think that, in man at least, the parathyroids might not play as important a part as the physiologists would have people believe.

MR. A. J. WALTON

aid that his experience of exophthalmic goitre was based upon 101 cases, but it must be clearly understood that they were in a sense selected cases, in so far that they had all had medical treatment which had failed to cure them. Naturally one practising surgery did not see the successes of medical treatment and it was difficult for him to determine what proportion of the whole these failures represented. If operative treatment was to be accepted as a routine measure two premises must be granted:—

(1) That the disease was due to hypersecretion.

(2) That the results of medical treatment were unsatisfactory.

(1) To his mind the experimental and clinical evidence were both strongly in favour of the disease being due to hyperthyroidism. It was true that now and again cases were reported which were said to show combined symptoms of hypothyroidism and hyperthyroidism and if this were so it would appear to be a very weighty piece of evidence that the disease was due to a perverted rather than to an increased secretion. He had carefully watched for such a case but he had so far not met with an example. The actual results of medical treatment could only be determined from the published statistics and in the past these results had not been good. The mortality appeared to be about 25 per cent. and there was no question that medical treatment often had to be prolonged over a course of many years. Dr. Mackenzie had stated that the results of medical treatment were extremely disappointing in many

cases, and such had been his (Mr. Walton's) own opinion although he had but little direct evidence to support it. Sir William Hale-White had given them a series of figures which at first sight seemed to favour medical treatment but, he (Mr. Walton) gathered from the paper published in 1912, that only 102 cases were traced out of a series of over 200, and they did not include a series of eighteen cases that died in hospital. If this were so they were manifestly of but little value, for a large proportion of the untraced cases might have died so that the mortality might be anything from the 15 per cent. given by Sir William Hale-White to well over 50 per cent. It was his custom never to operate in the first six months of the disease for it had seemed to him that it was in this period that the most beneficial results would be likely to accrue from other measures. It was thus evident that every case upon which he had operated had been treated for six months or more and many of them had been under treatment for as long as ten to fifteen years. His experience of these cases had been that while they were in bed having complete rest their condition was considerably improved but that as soon as they were up and about again and attempted to work their disease relapsed and that few, if indeed any of them, had been able to live a normal life while undergoing treatment. He had found that the results of X-ray treatment had been little if any better. Although great claims had been made for it he had seen but little benefit follow its use. He must admit, however, that, as in the case of medical treatment, it was mainly the failures that had come to him seeking further advice. His experience was based upon three groups of cases: (1) Those that had come to him after X-ray treatment. These included a series of eleven cases. Naturally they had obtained little or no relief or they would not have come to him. Many of them had had treatment under different physicians for over a year. It was important to note that they had come from all areas so that it could not be claimed that the bad results were due to incorrect technique. All of them had shown very considerable disfigurement from widespread telangiectases of the neck. Two had stated definitely that while under X-ray treatment their symptoms were greatly increased and that the thyroid became much more swollen. One of them had developed carcinoma of the skin which, although removed with a portion of the thyroid, later led to the death of the patient.

(2) A certain number of the patients upon whom he had operated in his early series had relapsed after a hemithyroidectomy, which he now knew to be insufficient. The symptoms had been as a rule mild and therefore they were especially suitable for X-ray treatment. There had been four such cases and although given a trial with this method they had obtained no relief whatever.

With regard to cases seen in the early stages when operation was inadvisable there had been only one such case in which X-rays had been tried, for as a general rule but few were sent to him in so early a stage. In this patient the X-rays had been combined with medical treatment and the patient made a complete recovery. For these reasons it was his custom to advocate medical treatment: (a) In the first six months of the disease; during this period cases were transferred to a physician and treatment usually consisted of rest, drugs and X-ray applications. (b) As a preliminary to surgical treatment; as long as the patient was kept in bed and at complete rest very considerable improvement would follow and no operation should ever be undertaken until such a preliminary course had been given. (c) There were certain cases in which probably too small an amount of thyroid had been removed.

They reached the third stage after operation but failed to progress further. Medical treatment would then often help them to effect a complete cure. In all other cases operation was advocated. In performing the operation he would lay stress upon the importance of the following details:—

(a) *Selection of the Time of Operation.*—There could be no question that the safety of the operative measures in large part depended upon the careful selection of the time at which operation was undertaken. Sometimes there were in the first six months or so very acute symptoms, and if an operation were then undertaken the mortality was likely to be high. With careful medical treatment the symptoms would often abate, but having reached a more chronic stage would fail to make further progress. It was in such a stage that the operation should be undertaken. All cases showed a very marked periodic variation. It would be noted, if a pulse and temperature chart were kept, that there were waves of exacerbation and depression and that a period of exacerbation always followed any excitement such as moving the patient to a hospital or nursing home. It was most essential that the operation be delayed until a period of depression of the symptoms. Hence no operation should ever be performed immediately after the patient had been moved to a hospital or home. He believed the importance of this step to be very great and that two of the deaths in his early cases had been directly due to the fact that he did not realize this important point. He had not found the variation which had been described by Mayo, who stated that the best time to operate was either within the first six months or after the end of the first year; that there was an exacerbation in the second six months during which operation became a more risky procedure. He (Mr. Walton) had found that if the patient were carefully watched operation could as successfully be undertaken during this period as in any other. In the late stages of the disease secondary changes would occur, especially in the heart and kidneys. If an operation were undertaken in this period the mortality would be high but it must be realized that with any other form of treatment the disease would steadily progress and that the only hope of arresting its progress lay in operative treatment. The risk should therefore be carefully explained to the relatives but operation should never be postponed because of these complications. He had one case in which the disease had been in existence for eight years and very marked cardiac changes had been present which quite incapacitated the patient from working. Since operation he had improved enormously and although he still had a heart-beat which was the most irregular that Mr. Walton had ever met with, he was able to live a useful and happy life. Although his heart would probably never be normal the disease had almost certainly been arrested.

(b) *Selection of the Type of Disease.*—Three clinical types might be recognized two of which alone were true examples of exophthalmic goitre:—

(1) *The Vascular Type.*—This condition was most commonly seen in young women. The thyroid was large and there was much pulsation. There was a rapid pulse and well marked exophthalmos. The chief complaint was of dyspnoea and palpitations. Nervous symptoms might be present but they were not the chief factor in the disease. This type showed as a rule very good results after operation. The mortality was low and the progress after operation was rapid.

(2) *The Nervous Type.*—This was generally seen later in life and was most commonly found in women at or about the menopause. The thyroid was often but little enlarged. Cardiac symptoms and exophthalmos were present

but were not so marked. The chief trouble was centred around the nervous system. The patient was distinctly nervous, with tremors and erratic movements so that she could hardly sit still. Her condition somewhat resembled that of chorea. The prognosis in these cases was less satisfactory. The mortality was slightly higher and improvement was slower in its onset. Some of them showed definite mental symptoms and it had been his experience that if there had been any form of mental disturbance before operation the mortality was likely to be much higher.

(3) *Hyperthyroidism with Adenoma.*—These cases were not examples of exophthalmic goitre at all but they were so often included that it was well to mention them. There was a localized soft adenoma in one or other lobe which was associated with considerable evidence of hyperthyroidism but he had never yet seen a case in which hyperthyroidism was complete. In no case so far had exophthalmos been present. These were the most satisfactory cases upon which to operate. The mortality was negligible and the progress was extremely rapid. The hyperthyroidism might completely cease within a fortnight after operation. It was often stated that the good results of surgical statistics were in large part due to the fact that the published series included many cases of this type. It was to be clearly understood that this series of his did not include a single example of this variety.

It was important to remember the risk of operating for some other condition in a patient who was the subject of hyperthyroidism. These patients seemed especially prone to gynæcological lesions and, together with Dr. Andrews, he had seen a considerable number of cases in which the patient had been suffering with a uterine fibroid or some ovarian lesion. It had been his experience, which he believed was general, that operation elsewhere upon the body was associated with the same risk of increased hyperthyroidism without the relief which was gained by removal of a portion of the thyroid. For this reason he always advocated that wherever possible the thyroidectomy should be performed first. Later, when the condition was improved, the other operative measures could be carried out with relative safety.

Choice of Operation.

He believed that the two chief dangers at operation were dependent upon pressure upon the gland and upon hæmorrhage. It was difficult to say whether these patients really stood the loss of blood badly, whether the increased bleeding was simply evidence of the marked activity of the gland or whether the attempt to control the hæmorrhage was associated with dangerous pressure: whatever were the explanation there was no doubt that if the hæmorrhage was severe the reaction after operation was much more marked. Owing to the dangers of pressure a wedge resection should never be performed. The portion of thyroid to be taken out should be removed by slow and careful dissection, all the vessels being ligatured before they were divided. So far he had never yet performed the operation of preliminary ligature nor of injection of boiling water. It had seemed that by carefully selecting the time of operation the condition could be so improved that a partial thyroidectomy could be performed with safety. He admitted, however, that some of the more severe cases could be much benefited by a preliminary ligature and that it might render the later operation safer, although Kocher had found that it gave rise to as severe a reaction as a partial thyroidectomy. The operation of partial thyroidectomy appeared to be the one of choice.

Preparation for Operation.

Much of the success of the operation was dependent upon careful preparation of the patient. Stress had already been laid upon the importance of keeping these patients under medical treatment until their symptoms had abated. During this period it was always his custom to have saline injections administered. They were given three quarters of an hour before the time at which the operation was to be carried out upon the appointed day. They seemed definitely to diminish the toxæmia and to cause an abatement of the symptoms. The choice of anæsthesia was extremely important. The evidence appeared to be convincing that there was real danger in the use of chloroform and that the very high mortality which had been reported in the earlier series was dependent upon the use of this drug. Personally he disliked operating upon patients under a local anæsthetic and especially patients who were so extremely nervous. He, therefore, never used it, although it must be admitted that in the hands of others it had given extremely good results. He even went further than this and believed that the anticipation of the operation might lead to an increase of the nervous symptoms. It was therefore his custom, wherever possible, to carry out the operation without the patient's knowledge. The relatives were informed but were asked not to communicate the fact to the patient. On the day of the operation the customary rectal saline was replaced by olive oil and ether, three ounces of each being given *per rectum*. Within half an hour the patient was quite unconscious and was then taken to the theatre. The dose was a minimal one and its effects were not sufficient to last through the operation. The anæsthesia was therefore continued with open ether, but Mr. Daly informed him that as a rule he only found it necessary to administer one or one and a half ounces.

Operative Technique.

Since pressure upon the thyroid gland was likely to increase the hyperthyroidism the operation should always be performed slowly and carefully. The usual collar incision was made and the pretracheal muscles, contrary to the usual custom, were transversely divided. Slow and careful dissection revealed in turn the superior thyroid vessels, the middle and inferior thyroid veins of one side, usually the right, each of which was ligatured and divided. The inferior thyroid artery was then exposed and ligatured *in situ* but not divided. The right lobe was now turned inwards, freed from the trachea and a small slice on the posterior surface was cut and left behind. The isthmus was then freed in like manner, the inferior thyroid vein of the left side was ligatured and divided and the superior vessels of the left side were ligatured but not divided. The lower surface of the left lobe was freed from the trachea and the lobe was cut across. If there was much oozing the cut surface of the left lobe was sutured with a running suture of catgut. It would be seen therefore that the right lobe, the isthmus and half of the left lobe were removed, the portion which was left behind being about the size of a chestnut. A tube was inserted and the muscles and skin sutured. In severe cases a smaller portion must be removed.

After-treatment.

After every operation there was a period of reaction which was probably due to hyperthyroidism following the trauma. The tube should therefore be kept in place until the temperature was normal. In one case in which it had

been accidentally removed too soon the patient had an acute attack of hyperthyroidism. It had been rapidly reduced when the tube was re-inserted. On reaching the ward a rectal wash was given to remove the olive oil and ether and frequent rectal salines were given. If the patient was at all restless morphia was given without stint. No harm could arise if it was administered only when the patient was restless and he had not uncommonly to give as much as 2 gr. in separate $\frac{1}{4}$ -gr. doses within the first twenty-four hours.

Operative Results.

Of the 101 cases which had been treated there had been an immediate mortality of five. There was no question that this was too high. Three of the deaths had occurred within his first fifty cases, and two of them were almost certainly due to the fact that the operation was performed at an unsuitable time. Of those that had recovered from the operation five had died later. One death was due to an X-ray carcinoma and should not therefore be included. Two had developed a fatal diabetes and two had died with cardiac symptoms, probably directly due to the hyperthyroidism. Of the remaining ninety-one cases fifty-two were cured, twenty-three had been so relieved that although they still showed exophthalmos and a pulse which was considerably increased, they were yet able to live normal lives and earn their own living; that was, 75 per cent. had been changed from disabled wrecks into people who were capable of living normal lives and of earning their own living. Eight had obtained but slight relief and two were no better. They had developed marked hypertrophy of the remaining portion of the thyroid. Possibly, if they would consent, relief might be gained by further operative measures. Three had relapsed until their condition was nearly as bad as formerly and three had been lost sight of. In considering the after-results of operation it must be remembered that for a certain period the symptoms would continue, for the amount of thyroid to be removed had to be determined more or less empirically and in order to be on the safe side rather too much was sometimes left. It was only when this diminished that the symptoms decreased. Careful observation after operation would show that the progress might be divided into the following stages:—

(1) *The Stage of Reaction*, which lasted for two or three days after operation. The hyperthyroidism was much increased as shown by a raised temperature and pulse and by marked restlessness. It was in this stage that a fatal result was likely to occur.

(2) *The Primary Improvement*.—This was the period which followed immediately after the reaction and the improvement was often most remarkable. The exophthalmos might be diminished, the pulse which had been 120 or 160 before operation might fall to 80 or 90 and the nervous symptoms might abate enormously. It was a remarkable thing that many of the patients had shown a complete amenorrhœa for several years before operation, but during this period of primary recovery the catamenia might reappear and might be regarded as one of the first evidences of improvement. This stage persisted as a rule for two or three weeks.

(3) *The Stage of Relapse*.—After the patients had left the home or hospital they suffered from a certain amount of relapse which might often cause considerable disappointment. If the case was progressing favourably it would last for only two or three months. Sometimes it might be prolonged for six or nine months, and if insufficient thyroid had been removed, or if there had been much hypertrophy of the remaining portion the patient might continue in this

stage. Those cases in which there had been little or no relief belonged to this group.

(4) *The Stage of Apparent Cure.*—This period, during which the patient was apparently well but might relapse under any severe stress, might persist for two or three years. It had been most in evidence during the war. Several of his patients who had been apparently quite free from symptoms had been exposed to air raids and within a short period of time had had a very definite relapse of their symptoms.

(5) *The Stage of Complete Cure.*—This followed the last at an indefinite period. It was difficult to say when it had been entered upon, but apparently a time arrived after which the patient might be exposed to severe stress with no more fear of hyperthyroidism than would occur in a normal person.

Professor H. G. EARLE

said that for two months he had been using the basal metabolic test, which, in theory, was based upon the assumption that the thyroid set the metabolic rate. With hyperthyroidism the metabolic rate was increased. He considered the test to be of value. By Benedict's apparatus, which he had been using recently, a direct measure could be obtained of the oxygen consumed. He had experienced great difficulty in taking the readings at first, but by means of an improvement whereby graphic methods were obtained it was now possible to secure a very accurate measurement. The metabolic rate usually followed the pulse-rate, a high pulse-rate being generally accompanied by a high metabolic-rate. There were other groups of cases, however, in which either a high metabolic-rate was accompanied by a low degree of tachycardia, or a low metabolic-rate with a high degree of tachycardia. Cases with a high metabolic rate after a period of rest in bed were unfavourable for operation.

Mr. J. E. ADAMS

said that his operative experience of Graves' disease perhaps hardly justified his speaking on this subject, but he had seen from within what Mr. Berry had already described as the conversion of Dr. Hector Mackenzie. At St. Thomas's Hospital he believed the high mortality in the past had been due to the use of chloroform and the failure of the surgeon to realize that no rough handling of the thyroid was permissible. Now one of the virtues of local anaesthesia was that it compelled the surgeon to be gentle. It had the disadvantage that the operation was rather trying for both the surgeon and the patient. With gentleness and patience it was not a difficult operation but it did inflict some strain on both parties. There was much therefore to be said for rectal ether, and for hemithyroidectomy this method of anaesthesia was almost ideal. For a prolonged operation it was certainly dangerous to give all the anaesthetic before one began the operation. Mr. Walton had told them how he got over this difficulty, and if open ether was safe perhaps one ought to employ it, but he thought there were post-anaesthetic disadvantages.

Hemithyroidectomy under local anaesthesia was relatively easy and safe but it did not cure the patients. Many of them, however, were quite satisfied with the result, and a patient he had operated upon a year or two ago, had promptly got married after the operation without his consent. She had had one child, and enjoyed her life, but she was not cured. He had suggested

that he might complete the cure by a further operation but the patient saw no need for this.

The difficulty which presented itself was to devise one operation which satisfied the surgical requirements of safety and cure, and the suggestion which he had to make might possibly be worthy of trial. It was that they should make use of radio-therapy in addition to surgery. X-rays either alone or before operation did not seem to fulfil the requirements and though good results had been claimed for radium he believed it had nearly always been employed through the skin by what was called cross-fire irradiation. He believed that if a hemithyroidectomy were combined with the burying of unfiltered radium in the remaining lobe it might be possible to obtain cures by what was almost a minor operation.

He was sorry he could only offer this as a suggestion and that he had not yet had an opportunity of trying it. He saw no technical difficulty, for the sutures attached to the tubes of radium could be brought out at the point at which the wound was customarily drained for the first twenty-four hours after operation. As to the proper dosage, 50 mgr. buried in each pole of the remaining lobe for say eight to ten hours might reasonably be expected to produce such a degree of atrophy as would obviate the need for a second operation.

Dr. HERNAMAN-JOHNSON

said that in order to treat Graves' disease intelligently by means of X-rays and electricity, one must have a working hypothesis as to the nature of the disease.

Exophthalmic goitre could not be brought about by thyroid feeding; but Cannon had shown that the clinical picture of acute Graves' disease might be brought about by stimulating the sympathetic. The sympathetic, however, was the servant of the emotions, and also at times their master; it ruled the ductless glands, and was ruled by them; it might be depressed by bowel toxins, or its faulty working might result in the formation of such poisons. They could not put their finger on any single prime cause of Graves' disease. Hence the treatment must at present be symptomatic and empirical. Surgical treatment was in reality symptomatic. It broke one of the interlacing vicious circles which made up the symptom-complex, and gave the patient a chance of recovering his balance: it did this by a direct reduction of the thyroid hormone circulating in the blood. X-rays had been for long administered with the same idea; it was believed that they could act directly on the gland, reducing its secretion by cell destruction and fibrosis. It was true that this could be done, but it was usually an unjustifiable proceeding now that the mortality of operations had been so much reduced. Fortunately, in most cases this destructive action did not occur, owing to the dosage not being large enough; but what did occur—in addition to the kind of local effect to be referred to later—was the constitutional benefit derived from X-rays. This was shown by the fact that rival schools rayed the thymus, the ovaries and the cervical sympathetic, all with good results. X-rays in small doses, applied anywhere to the body, had a resistance-raising effect which was not specific, but was manifested in cancer, in tuberculosis and other diseases as well as in Graves' disease. Small doses were not without action on the thyroid, but it was in the nature of a regulation and was not accompanied by histological change.

50 Hernaman-Johnson: *Treatment of Graves' Disease*

The galvanic current had a very similar effect, but had more action upon the exophthalmos: X-rays should be thought of as much for their general as for their local effects. X-ray treatment lowered the pulse-rate, reduced tremor and gave rise to a feeling of well-being. At the same time the patient put on weight.

A difficult case might require symptomatic drug treatment and psychotherapy in addition to X-rays and electricity. The X-rays and electricity were not in any sense alternatives to surgery, which had a definite place in the treatment of the disease. Radiotherapy and electrotherapy should be thought of as part of the regular medical armamentarium to be used in dealing with Graves' disease cases. Time should not be wasted in trying drugs alone, nor should rest be exclusively depended on. There might sometimes be practical difficulties in giving X-rays to patients in bed, but the galvanic current was always available. What so often happened was that months or years were spent in treatment by rest and drugs; then months more were given to X-rays; whereas the treatments should have run concurrently from the beginning. If this scheme were followed, surgery would become increasingly less needed; but those responsible for the medical treatment of a case must always keep in view the fact that operation might ultimately have to be undertaken, and should do nothing to the thyroid locally which might make the work of the surgeon more difficult.

With regard to Dr. Florence Stoney's paper, he was in full agreement with her as to the importance of eliminating any source of poison such as septic teeth. It was scarcely too much to say that every patient suffering from Graves' disease should have her teeth X-rayed, and be examined by the opaque meal method. Some of the patients, with much visceroptosis, were greatly helped by a properly fitting belt or corset, and by rhythmical electrical stimulation of the abdominal muscles.

The points on which he differed from Dr. Stoney were matters of theory rather than of practice. He had followed her work on radiotherapy in Graves' disease for ten years, and had no doubt of the excellence of her results. She told them of numerous cures made with eight to twelve applications; he ventured to think that these short courses regulated the function of the thyroid rather than that they caused it to atrophy, and also that they acted by raising the body resistance in general. With regard to her more chronic cases, perhaps she did cause some atrophy, and thus in some sense performed an operation.

If a patient deliberately chose the risk of telangiectases, or even a burn, to that of dying under a surgical operation, then he thought the radiologist was justified in heavy dosage. But, if the surgeons could reduce their mortality figures, to those of, say, the "interval operation" for appendicitis, then he thought destructive X-ray dosage would cease to be justifiable except in rare cases.

Mr. Adams' suggestion as to removing a part of the thyroid by the knife, and burying the radium tube in the remainder seemed to him to combine the disadvantages of surgery and radio-therapy. The operation mortality figures would presumably be the same, and its precision would be gone—for who would say how much destruction a tube of radium would produce in the remaining portion of the gland?

In conclusion, he would refer briefly to the terrifying pictures which Mr. Walton had shown them of patients with their necks scarred by X-ray burns. X-ray technique had had less than a quarter of a century to develop;

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surgery, even modern surgery, was the growth of several generations. Ten years ago, skilled radiologists burned their patients at times; the unskilled continued to do so even to that day. But the radiological mistakes of the early years of this century lived to rise in judgment at clinical meetings—which was not always the case with surgical mistakes! Relapse after operation for exophthalmic goitre was not unknown, and the victims often sought the aid of radiologists, most of whom, if inclined to retaliation, could produce photographs quite as gruesome as any shown there that night.

(The meeting was adjourned to March 11.)

Clinical Section.

President—Sir ANTHONY BOWLBY, K.C.B., K.C.M.G., K.C.V.O.

(Joint Meeting with the Sections of Medicine and Surgery.)

DISCUSSION ON THE MEDICAL AND SURGICAL TREATMENT OF GRAVES' DISEASE.¹

Mr. C. A. JOLL

said that reference had been made during the discussion to the views of Dr. McCarrison and others that Graves' disease was due to intestinal stasis or some other form of obscure sepsis. The evidence for this conception of the aetiology of exophthalmic goitre was extremely meagre and unsatisfactory. He had sought carefully among his own patients for septic foci, and had obtained the help of his colleagues in investigating those areas which were in the province of the special departments. The conclusion at which he had arrived was that there was no ground for believing that Graves' disease was caused by intestinal or any other type of septic absorption.

In attempting to estimate the mortality of Graves' disease, statistics were quite valueless unless they rigidly excluded all those forms of hyperthyroidism which were not associated with the histological changes so typical in true Graves' disease. Nothing had more tended to obscure the truth than the attempt to group all forms of hyperthyroidism together by introducing such terms as false Graves' disease or *formes frustes*, &c. No disease had a more definite clinical and histological picture than Graves' disease, and there was very seldom any real difficulty in referring a given case to its proper group. Yet he was constantly seeing patients who had been diagnosed as cases of Graves' disease, and who had been treated for months by rest, X-rays, and so on, but who were really suffering from encapsuled tumours in the thyroid gland which should have been removed without delay.

In true Graves' disease the danger of the operation and the degree of benefit likely to follow, depended very largely on the length of time during which the disease had been present. No surgeon who had had an extensive experience of this work would affirm that absolute cures were to be expected if those toxic changes in the various viscera, which were so well known to occur in the later stages of the disease, were already in an advanced stage. On the other hand, he had found that complete cure in the most rigid sense was possible, if the operation were done sufficiently early and an adequate amount of the gland removed. He therefore joined issue with those who advocated a policy of "wait and see." He was convinced that if every case of Graves' disease were treated surgically on sufficiently radical lines within three to six months of the onset of the disease the mortality would fall to a negligible

¹ At an adjourned meeting of the Sections, held March 11, 1921.

figure, and cure would be absolute. Unfortunately at present they did not always see those patients at that early stage, and therefore special precautions were necessary to determine whether an operation could be undertaken with reasonable safety, and further what type of intervention was wise. He had derived very great help from Dr. Strickland Goodall and from his medical colleagues in making these decisions. He entirely agreed with those who advised a period of rest in bed before the operation, and this might need to be as much as six months or as little as a week.

Anæsthesia.

He had noticed that Mr. Dunhill said very little about local anæsthesia. He had rather gathered from his paper that he (Mr. Dunhill) had to some extent modified his attitude towards this important question, since he mentioned having recently operated on one of his patients under general anæsthesia. In spite of Dr. Mackenzie's eulogy, Mr. Joll was sure that local anæsthesia was *not* the panacea for operations on Graves' disease. He used it, however, where the patient preferred it, and he employed it, too, in advanced myocardial disease, but the plea that its use was a dominating factor in reducing mortality could not be maintained, since the results under light open ether in good hands were quite as good as those claimed by the advocates of local anæsthesia. Local anæsthesia, too, was often unsatisfactory, as those who had seen it in use would admit.

They had been fortunate at the Royal Free Hospital in having a staff of anæsthetists accustomed to that degree of light open ether anæsthesia which he considered to be ideal for the majority of operations for this disease.

Scope and Nature of the Operation: Ligation of Vessels.

Very little had been said during the discussion on the ligation of the thyroid arteries as a method of treatment. He was a convinced advocate of the ligation of the superior thyroid vessels (*a*) in very mild early cases, which he had occasionally seen cured in this way, (*b*) as a preliminary step in grave and advanced cases. The operation was simple, and was very suitable for local anæsthesia, and a striking degree of improvement often followed. It was generally necessary to resect a part of the gland three to six months later, and such could be done at this stage with less risk than would have been involved in immediate resection.

He had only once injected boiling water into the gland as advocated by Porter. The patient had been operated on elsewhere before, and apparently the operation had to be abandoned owing to hæmorrhage. When he had attempted to expose the gland he found that it had become so bound up with the muscles that no plane of cleavage could be discovered, and he therefore had adopted Porter's method. He confessed he had been surprised to hear a few months ago from the patient that she was perfectly well.

He was glad that so many of the speakers had referred to the gentle handling of the gland during the operation. It was to this that he would ascribe the improvement in the statistics at certain clinics. The amount of gland to be removed could not always be decided before the operation, as it might be necessary to modify one's plans as the operation proceeded, but he set out as a rule to excise three-quarters to four-fifths of the whole gland: Hemithyroidectomy would not *cure* Graves' disease, though it would generally *improve* the patient's condition.

He confessed he was unable to understand those who claimed that it was necessary to remove every scrap of gland tissue in the neighbourhood of the recurrent nerve. If a small portion of the gland were left in this situation, cases of recurrent nerve paralysis did not occur, while he understood the incidence of this disastrous complication was very high where this precaution was not adopted. He had often examined this little piece of gland during secondary operations for the removal of a further portion of gland, and in no case had he seen any evidence of its hypertrophy.

The solution to the problem of the treatment of this disease appeared to lie in the direction of earlier operation, more extensive resections and avoidance of hæmorrhage during the operation.

DR. LEONARD WILLIAMS

contended that cutting operations on the thyroid gland were altogether inadmissible in Graves' disease. Graves' disease was not only not a hyperthyroidism, but it was not a disease of the thyroid gland at all. There were cases, and many of them were very severe, of Graves' disease in which there was no enlargement of the thyroid. The most outstanding features of the complaint—namely, exophthalmos and cardiac troubles—were due to the implication of other glands. As Maurice, of Lyons, had pointed out, exophthalmos was due to adrenal excess. The cardiac symptoms were due to enlargement of the thymus gland. Graves' disease was due to a toxæmia in which all the members of the endocrine hierarchy were involved. The only way of treating the disease was by discovering the source of the toxin and eliminating it. The toxin was gastro-intestinal in a large percentage of cases, and could only be successfully dealt with by dieting and, if necessary, intestinal antiseptics. The responsibility of the thymus was a point too much neglected. It was enlarged in about 85 per cent. of the cases, and its enlargement caused not only the cardiac symptoms by direct pressure on the base of the heart and the great vessels, but also many of the nervous symptoms by pressure upon the pneumogastric, the sympathetic, the phrenic; and the mental symptoms by interfering with the drainage system from the brain. There was no more justification for the ablation of one lobe of the thyroid in Graves' disease than there would be for the removal of one kidney in diabetes.

DR. C. M. WILSON

said that there had been a disquieting similarity between this debate and that of 1912. For the most part it was necessary to refer to the date at the top of the page to assign this or that speech to its proper period. Small advances in surgical technique had certainly occurred, and a field that was then the province of a few surgeons was now tilled by many. But in the main a decade had gone without bringing final answers to questions which vexed them then. And while they were marking time they had remained divided into two camps, and not only were the two camps unable to convince each other, but they had not found it possible to present their facts in such a manner that those who belonged to neither could sit in judgment between them. And this was the position not with regard to some difficult and intricate problem of causation, but about the actual results of treatment. What was the secret of this confusion? Was it not because the terms used to describe the condition of a case or group of cases either before or after operation did not succeed in conveying

to others the type of case they had in mind? They were in doubt as to what was included under the term Graves' disease and what was excluded. And even when they knew that they were baffled by what was meant by mild, moderately severe, and severe cases. They needed standards. The rational way of ending this state of affairs, if it could be ended, was to express in figures the degree of severity of a case of Graves' disease at any one time, so that all might know the type of case described and be in a position to compare accurately the results of different methods of treatment. It was these considerations, he said, that had led him nearly a year ago to check his clinical observations by measurements of basal metabolism by a modification of the method in use at the Mayo Clinic. This method possessed the advantage that it was admittedly more accurate, and the apparatus more portable, than Benedict's instrument, which, however, had the advantage that it did not require the technique of gas analysis; but he could not enter here into the respective merits of the two different methods of obtaining measurements of the basal metabolic rate. The point was that mathematical measurements could be made by either method of the toxicity of a case of Graves' disease at any one time. These measurements would, he hoped, provide the missing link between the worker and the reader of his printed results. For example, if a case was admitted to hospital with a metabolic rate of 70 per cent. above normal, and this rate was brought down by treatment to 35 per cent., those figures conveyed to others the exact toxicity of the case before treatment and the measure of success achieved. But if, on the other hand, a case which they would now label moderately severe became after treatment a so-called mild case of Graves' disease, no one except those in charge of the patient was really much the wiser.

The Importance of Early Diagnosis.

But these measurements were not only valuable in the selection of the type of treatment, but in following its results; just as they watched a case of diabetes by estimations of the percentage of the urinary sugar. They were particularly helpful in early diagnosis, of which they had heard too little in the debate. At the present time if unusually favourable results were reported in the treatment of Graves' disease they were met with the criticism that those cases were not Graves' disease at all, because they lacked this or that sign of the complete classical picture, till they were led to question whether this disease had a youth at all, or whether it sprang into being fully formed, like Pallas Athene from the brain of Zeus. The term pulmonary tuberculosis was not confined to cases with cavity formation, and it was no more rational to restrict the name of Graves' disease to a late and intractable stage of the malady. Basal metabolic measurements would provide an incentive to the early treatment of this disease by carrying assurance to the physician that there was actual over-activity of the thyroid, and by convincing him that at such a stage the over-activity could be rapidly reduced to normal limits. They might therefore look for a time when severe and moderately severe cases, around the treatment of which that discussion had so largely centred, would become clinical curiosities. Pending that time they must evolve some rational procedure in the selection of the line of treatment of such cases. The type of patient to which he was referring generally improved with rest in bed. The metabolic rate fell, for example, from 60 per cent. above normal to 35 per cent., but in many cases after a variable period no further fall occurred, the basal metabolic rate remaining stationary. There were then two alternatives—to trust to time in the faith of Sir William Hale-White that it would prove a reliable ally, and that

meanwhile no great harm would befall the patient or the patient's tissues, or, on the other hand, to seek by surgery or X-rays to reduce further the basal metabolic figure to normal. It was the choice between these two alternatives that was the difficulty. It might be profitable to consider certain factors that appeared to be delaying the solution of the problem.

The Role of the Physician in Graves' Disease.

Primarily, as he had already said, the lack of standards impeded them, but the solution was not brought nearer by a certain lack of detachment very noticeable in that discussion. He would enter a plea that the rôle of the physician in Graves' disease was not as the advocate of this or that method of treatment, but that he should speak as from the bench and with a like authority. There were too many advocates. Some speakers, for example, had contended that the desired result in that disease was more certainly and more permanently attained by operation than by any other means. This was a comparative claim. It implied that the surgeon either had personal and prolonged experience of these other methods or, in default, that he had access to published statistics with which he could compare his own results. But, as they knew, no such data existed. Without such intimate experience of alternative measures those surgeons' results had only the value of uncontrolled experiments. Then there were other speakers who had never seen any improvement from X-rays. He would invite them to check their clinical observations by metabolic measurements. They would find that when rest had done all that it could do in many cases X-rays would effect a further fall, often to normal. In America, such careful workers as Means and Aub affirmed that when the cases were followed for several years there was very little to choose between the end results of surgery and X-rays. He could not escape the feeling that when the same time and thought had been given to working out the dosage and other details of technique as had been devoted to elaborating surgical methods, a more favourable verdict would be passed.

Finally, there was the physician who was averse to surgical interference in any circumstances whatever, on the ground that operation was both unsafe and unnecessary. Such a view, though apparently at variance with the clinical experience of most, had not been finally dismissed, because the criticism directed against it had been vague and ineffective. Surgeons brought to these meetings patients and photographs of patients to prove that thyroid over-activity could be controlled by operation. But that was not the point. The immediate benefits of surgery were not in question; they were rather concerned with the permanency of such results and with the necessity of operation. The case against the surgeon was that operation was unsafe and that it was unnecessary. The risk might be immediate or remote. But if the results of surgery were all that had been claimed, he confessed that he was not greatly perturbed by a 5 per cent. mortality after operation. Those who were had been more fortunate in the results of conservative treatment than he could claim to have been. He, however, was much more concerned with the more remote danger of hypothyroidism. The more they worked in this field the more they came to question not how much of the gland they might safely remove, but whether, taking a wide view of the thyroid's activities, they dared remove any. On the other hand, certain observations in metabolism that he had made demonstrated that this risk of hypothyroidism was not confined to cases treated surgically, but was present after X-rays and even after the cure that nature brought about. The point they had to settle was, Did a certain

degree of hypothyroidism short of classical myxœdema, but involving a measure of impaired health of which they had taken too little notice in the past, commonly occur, and in that event was surgery the most frequent offender? They might look to basal metabolic measurements to enlighten them on this point. Finally they came to the question, Was operation necessary? and if they were not greatly intimidated by the mortality they would want to know whether Mr. Dunhill's contention that a comparatively large number of patients with this disease suffered grave and permanent damage to their tissues held against Sir William Hale-White's contention that few in fact did so suffer. If they agreed with Mr. Dunhill it was clear that if they shunned surgery altogether many were deprived of the chance of complete recovery. But if they agreed with Sir William Hale-White, then all they stood to lose by adopting conservative measures was a period of invalidism extending perhaps over some years, and the fact that such a period of enforced idleness was for many economically impossible. But even if they agreed with Mr. Dunhill, surely the way to prevent such irreparable damage to tissues lay in early diagnosis, and not with the scalpel. He had made frequent measurements of basal metabolism in 140 cases suffering from hyperthyroidism, the results of which he could not give there. For the moment he was concerned to rescue the method of measuring basal metabolism from the charge that might be formulating in some minds that it was the latest fad in instruments. They needed standards; basal metabolism supplied them. There was a natural reluctance to replace clinical observation by laboratory methods, and the value of any procedure was directly proportional to its simplicity and its general applicability. If records of the pulse and weight of the patient provided what was necessary there would be no place for those measurements, but the pulse, though fairly accurate as a relative gauge of the patient's condition from day to day, was far from an absolute measure of the toxicity in a particular case; it did not furnish the standard for which they were seeking, while the weight was a singularly erratic index to the patient's progress. The criticism that basal metabolic measurements were too complicated to win a permanent place in the physician's everyday methods came curiously from those who had employed the electrocardiograph in selecting cases for operation. He hoped that these measures would come into general use, so that before the next discussion it would be possible for results to be expressed in a manner understood of all.

Dr. S. A. K. WILSON

said that he was disappointed that so little had been said of the pathology of a disease for which so many methods of treatment had been advocated. He was absolutely in agreement that exophthalmic goitre was not a disease of the thyroid gland, but regarded it as a neuro-glandular disease. Changes were well recognized as occurring in the intermediolateral tract of the spinal cord. In seven fatal cases changes had been found in this tract. It was impossible to dissociate the nervous side from the picture of Graves' disease, nor should it be ignored. At present the disease was being treated from without, but he hoped that later it would be treated from within.

Mr. MARTIN BERRY

said that surgeons and physicians had, he believed, been known on occasion to differ as to the treatment which should be adopted for a case, but they appeared for once to have joined hands in damning X-rays with rather less than faint praise as a remedial agent in the treatment of exophthalmic goitre. It was therefore incumbent on radiologists to show that they could cure this distressing and prevalent disease. In proof of this nothing could equal actual case reports, and he would therefore describe the course of a few cases selected as showing certain special features or special difficulties in treatment. He would specially emphasize the fact that X-ray treatment could be carried out without confining the patient to bed, and in many cases without disturbing his usual daily life. None of the cases included here were ordered to remain in bed.

Before a cure was spoken of, it must be understood what was meant by the term. Was it disappearance of the tumour in the neck or the protrusion of the eyes, or was it the relief of the nervous symptoms which so distressed the patient? He regarded a case as cured when the nervous symptoms disappeared and did not return; he paid no attention to the neck or the eyes, though in many cases these showed great improvement.

As regarded suitability of cases for treatment, the only contra-indication for irradiation was pressure on the trachea causing urgent dyspnoea. He made it a practice to radiograph the trachea to determine what degree of tracheal narrowing, if any, was present.

The earlier a case came for treatment the more rapid was the cure, and, in the treatment of acute cases he generally gave small doses at frequent intervals, increasing the size of the doses and the intervals between them according to the duration of the disease.

Case 1.—A single woman, aged 41, with symptoms of seven years' duration. During the whole course of the treatment she had been engaged in household duties which were often laborious, and these duties could not be delegated to others. The leading symptoms had been dyspnoea, palpitation, tremors, and frontal headaches. The eyes were rather prominent and the neck enlarged. Treatment had been commenced in September, 1918, and fifteen doses were given between that date and Christmas, and by that time all symptoms had disappeared. She had remained quite well until the following August when, after a period of excessive work and considerable worry, there was a partial return of the symptoms. Five further doses had been given, the last dose being given in October, 1919. No further treatment had been required, and she was now in perfect health and working hard. Her pulse was 72, her eyes normal, and her neck only slightly full. All nervous symptoms were entirely absent.

Case 2.—Female, aged 68. Goitre for eight years, worse during past year. Marked tremor, sweating, and dyspnoea. Vertigo and some nystagmus. The course of treatment had been prolonged by the fact that she had had two accidents during the time. In all she had had twenty doses, ending in March, 1920, and she had remained well since that time with no symptoms at all except a slightly accelerated pulse.

Case 3.—Female, aged 41, married, five children. The nervous symptoms in this case had been very marked and the pulse was 128. Neither the neck nor the eyes had been very prominent, but she had been greatly distressed by the nerve symptoms and had had a most anxious appearance. She had been first seen in April, 1920. The pulse had responded rapidly and was 72 after five treatments at intervals of a week. Treatment had been continued at longer intervals, and she had received a further four doses up to July, with a final dose in September, and since then she had remained well and able to live an active life.

Case 4.—Female, aged 38. Duration of symptoms five years. Had already been treated by medicine and prolonged rest in bed, but had been getting worse. At the time of the first treatment had had very marked tremor and palpitation, with a pulse of 136, prominent eyes, and considerable enlargement of the thyroid. After eleven doses in the period between May and September, all symptoms had abated except that the pulse was still 100, though it had been as low as 86. The cause of this rise of the pulse was the fact that the patient was helping to nurse her mother in a most distressing illness which ended fatally soon after. The patient then had had to cease undergoing treatment; she went to Scotland, and wrote to me several times to say that she was keeping quite well and had astonished all her relatives by what she could do without distress. He had seen her again recently, and had given two further doses as a precaution. She now felt perfectly well, and was working without any difficulty. Her eyes were normal, and her neck three-quarters of an inch smaller.

Case 5.—Female, aged 29. Previous to coming for X-ray treatment she had been under medical treatment for a year, and during that time her symptoms had become more serious and the size of her thyroid had steadily increased. She received sixteen small doses and three large ones, the last being in March, 1920, when her pulse was 76, and her symptoms gone. In July the improvement was maintained, though she had had no further treatment.

Case 6.—Male, aged 39. This patient had a very strong family history of Graves' disease, and he (Mr. M. Berry) had seen two of his relations with neuroses, one of whom exhibited symptoms of hyperthyroidism. He gave a history of four years' duration of symptoms, and at the time of the first treatment had great enlargement of the thyroid and very marked exophthalmos with tachycardia and much tremor. He had been treated by medicines and massage, but had not improved. He was first seen in July, 1920, and was treated first by small frequent doses and later by larger doses at longer intervals. His pulse responded rapidly and fell from 106 to 84 after three treatments. In all he had had sixteen doses to each lobe of the thyroid, and was very greatly improved, but was not yet completely cured. He was, however, able to play golf and had, throughout the whole treatment, performed the duties of a responsible position. Not only were his nervous symptoms very greatly improved, but his exophthalmos was much less and his neck materially smaller.

He also had in mind the cases of two officers whom he had treated amongst others in a military hospital about four years ago, but exact details of their cases were not available. One of them had shown a very striking picture with extreme exophthalmos and very great enlargement of the neck; his pulse had been so fast that it was impossible to count it, and the whole of his body was in a constant state of tremor. The other patient had shown the same symptoms, though not quite to such a marked extent. He had seen both of them recently, and their symptoms were entirely cured, the exophthalmos had disappeared, although some enlargement of the thyroid persisted. Both of them were living active business lives.

Dr. HECTOR MACKENZIE (in reply)

said that all who had carefully followed the discussion which had now occupied three meetings would agree that it was an important contribution to their knowledge of the treatment of exophthalmic goitre by surgery and by X-rays. One of the speakers that night on comparing this discussion with that which had been held ten years ago seemed to think that they stood now very much where they did then. He would therefore point out that there had been, during the interval, a great advance in surgery. Surgical skill had made operation much safer and those of them who had

seen what it could achieve felt that their hands were enormously strengthened in dealing with obstinate and protracted cases of this disease.

No one was better qualified to speak on the subject of thyroid surgery than Mr. James Berry. Mr. Berry, like himself, had changed his views as surgery had advanced, for at one time he had been opposed to surgical treatment of exophthalmic goitre. His table of seventy-eight cases operated on by him between 1913 and 1919 of which seventy-two were greatly benefited spoke for itself. Unimpeachable evidence of the successful treatment by operation had been adduced by Mr. Dunhill, Mr. Walton, Mr. Armour, Mr. Joll and Mr. Romanis.

If he were asked what had contributed more than anything else to making the operation safe he would answer local anaesthesia. He had noticed that neither Mr. Berry nor Mr. Joll were whole-hearted advocates of local anaesthesia but he himself had seen that safety accompanied local anaesthesia whereas general anaesthesia was attended by danger. He was sorry to differ from Mr. Berry and Mr. Joll on the subject of ligation of the thyroid arteries and he agreed with Mr. Dunhill and Mr. Walton that it was an operation which was not worth while doing. He had never seen any decided and permanent improvement resulting from it, and at one time when he was impressed with the danger of thyroidectomy quite a number of his patients were treated in this way. Two of his patients died shortly after the operation so that he did not consider it altogether free from risk.

Although Mr. Armour had suggested that sometimes too much gland tissue might be removed under hemithyroidectomy he had never seen any evidence of that. On the contrary sometimes not enough was removed under it. Mr. Walton rather underrated the results of medical treatment but one must remember that the surgeon more often saw the failures than the successes of medical treatment and Mr. Walton must be forgiven if he concluded that the results of medical treatment were bad.

He fully agreed with what Mr. Dunhill had said and neither Mr. Dunhill nor himself would wish it to be thought that they regarded operation as advisable or necessary except when a fair trial had been given to medical treatment and no satisfactory results had been obtained. Operation should not be undertaken except by surgeons with special experience in thyroid surgery.

Sir William Hale-White had contributed some account of the natural history of the disease founded on 102 cases in Guy's Hospital. Unfortunately it had not been possible to follow up the history of a considerable number of the cases and the conclusions on that account had lost much of their value. Some years ago he (Dr. Mackenzie) had attempted an investigation of the same kind but had found that many of the patients could not be traced. It had certainly not been his experience that the majority got well, and the mortality had been more than double that of healthy females. The Registrar-General's Reports gave about 400 deaths annually from the disease; no doubt a large number besides died from causes other than the disease itself. From data he had collected he concluded that about 25 per cent. of the cases sooner or later died from the disease.

Two of the speakers (Dr. Leonard Williams and Dr. Kinnier Wilson) had argued that the thyroid gland was not responsible for the symptoms of the disease. How then did they explain the wonderful improvement brought about by partial thyroidectomy? *Experto crede.*

The case for X-rays had been stated very fairly by Dr. Florence Stoney

and they were much indebted to her for her instructive tables of 200 cases treated by this method. Of her 200 cases, thirty had so few treatments that they might be excluded and of these three died. Of the remaining 170 cases, eighty-one had no exophthalmos and twenty-three had no goitre. Of these eight died and thirty-one did not do well. Seventeen seemed to have done very well. But even these results could not be claimed as solely due to X-ray treatment. Dr. Stoney had not limited her treatment to X-rays, but she said she had had to fight the dentist and the physician. She admitted that the treatment might be tedious and prolonged, and that damage might be done to the skin. He claimed that surgical treatment would in certain cases effect speedily and surely what X-rays might or might not accomplish after a course extending over many months.

In conclusion he would say that the outlook for patients with exophthalmic goitre was very much better now than at any previous time. Surgery practised on the lines of safety and prudence would help to restore many to health and to save an increasing number from drifting into a state of chronic invalidism. They must not relax their efforts to cure the disease by medical means and they must always remember that the patient had to be treated, not the disease only. Medical treatment must be carried out after operation as well as before, and if the result was not satisfactory the possible need for a second operation must be kept in view.

Mr. DUNHILL (in reply)

said that he thought that the discussion had been most helpful. He would reply to some points that had been raised.

Mr. Donald Armour considered that subdivisions into types should not be made, but that the term "hyperthyroidism" should be used for all these conditions. He (Mr. Dunhill) did not think this was right. In secondary toxic goitres, the course of the disease was not the same as in Graves' disease; the operative risk was far less and the prognosis after operation different. In teaching he proposed to differentiate all the cases, and use as accurate a nomenclature as possible.

Dr. Strickland Goodall's work was most useful; but if he had regarded a raised blood-pressure as contra-indicating operation, many of his patients would have remained without operation, who had stood it excellently and were now healthy and active members of society. Dr. Strickland Goodall's records were extremely valuable as showing the measure of recovery in heart conditions.

Mr. Joll was not right in thinking he had given up local anaesthesia. It tended to ensure safety, and greatly lessened post-operative worries. He used open ether in cases in which he thought it wise, but that was not often.

Dr. Leonard Williams stated that the thyroid had no more to do with Graves' disease than the kidneys had to do with diabetes. He said that proptosis was due to the adrenals; and the heart condition to the thymus. If what Dr. Williams said was true, it was difficult to understand why the pulse-rate dropped, the proptosis diminished, and the tremors vanished when thyroid tissue was removed but the adrenals and thymus were untouched. The patients at any rate, were grateful, and lived their life happily.

To what conclusions had the discussion led them?

He thought everyone would agree that the management of cases of Graves' disease should be in the hands of the physician. It was his to treat and pilot, but the duty lay on him to obtain what other assistance might be necessary.

He might require X-rays, but the case should never pass out of his hands. On the other hand, he should deal honestly with the patient, and directly the patient ceased to improve, the surgeon should be asked to see the case in consultation, not necessarily to operate, but to help to decide. For in these conditions the surgeon was not a mere carpenter. His was the practised judgment to say when operation was wise and safe; how much should be removed, and in what stages the operation should be carried out. Surgeons had been asked to substantiate the claims that they had made. He maintained that they had done so. No one could have seen the patients, the photographs of cases, and the records of Mr. James Berry, Mr. Walton, Mr. Romanis and others, and fail to be convinced of the great change that had taken place in the lives of these people. It was also to be remembered that the economical side came into the question. Many of these patients were young women; or women in the earlier years of married life with homes and families dependent on them. They should not be asked to give up too many years of their life in waiting for a problematical cure. The surgeon did not want to operate upon cases which were being cured, whether by medical means or X-rays, but he did ask to see the cases which were not being cured, before they reached the stage at which surgical intervention was fraught with great anxiety.

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Section of Dermatology.

President—Dr. ARTHUR WHITFIELD.

Case of Delhi Boil.¹

By A. CASTELLANI, C.M.G., M.D.

THIS young man, aged 26, joined the Army in 1915, and was sent to India, where he remained three years, most of the time near Delhi. He came back about six months ago, and a few weeks later he noticed some boils, as he called them, on his left forearm. He entered the hospital about five weeks ago for hepatitis; his liver was enlarged, with pain in that region, so much so that at first he was suspected to be a case of amœbic hepatitis. Scrapings from the nodules were microscopically examined, and numerous leishmanias found.

I am showing the patient not because it is a rare case—I think there are hundreds of cases of cutaneous leishmaniasis in this city—but on account of the following rather interesting points. First, the clinical condition is not typical. There is a central, rather large, shallow ulcer, and several papules and small nodules around it. The microscopical examination of all these lesions showed the presence of leishmania, therefore they are of leishmanic origin. The second point is this: It is generally stated that cutaneous leishmaniasis is a localized disease—i.e., it does not cause general symptoms, but in this case—and I have seen others very similar—the organism has, apparently given rise to a generalized infection, and to symptoms which point to internal disease. This man had fever for some time, which he called malarial fever, but malaria parasites were not found and quinine had no effect whatever. And, as I have said, his liver and spleen were large, hard and painful, the condition thus resembling kala-azar.

¹ At a meeting of the Section, held October 21, 1920.

2 Little: *Circumscribed Deep Induration following X-rays*

DISCUSSION.

The PRESIDENT said he would like to hear how Dr. Castellani proposed to treat this case—with tartar emetic? Also, what was the maximum dose which he considered safe, given intravenously. He (the President) had a typical case of Baghdad boil on the ear, and he had been giving a good lot of tartar emetic, as he reacted only slowly, probably because of the feeble circulation in the ear. He was anxious not to overdose him. The most he had given as yet was 7 c.c. of 1 per cent. solution.

Dr. BARBER asked if Dr. Castellani used tartar emetic locally on the sores. He had four cases of Baghdad boil in the last year, and had used an ointment of 5 per cent. tartar emetic in vaseline and lanoline. At first it caused considerable inflammation, but in each case the sores had healed up with that treatment alone.

Dr. CASTELLANI (in reply) said that his experience was that these cases, as a rule, stood tartar emetic very well indeed. Tartar emetic was less effective in cutaneous leishmaniasis than in kala-azar. He had seen cases of the latter cured in six weeks by it, but never Delhi boil cured so quickly. He started with $\frac{1}{2}$ gr. of tartar emetic, then increased it to 1 or 2 gr. A few weeks ago he had another case of Delhi boil, a lady, and tartar emetic did practically nothing. He then started treating her with emetin. This was not a new treatment: it had been used by him in Ceylon in 1914, and later it had been used in Egypt and Greece, with fairly good results. A few days after starting the emetin treatment the lesions quickly healed. In this case, he proposed to use emetin subcutaneously in the neighbourhood of the sores. The treatment of cutaneous leishmaniasis by tartar emetic ointment originated with his friend Dr. G. Low, some years ago, and he certainly obtained some good results. He (Dr. Castellani) gave it up because many of his patients complained of very severe pain. In three or four cases the lesions disappeared, but in one of them, after three months, and in another after six months, there was a relapse. He believed that cutaneous leishmaniasis, even in mild form, was not merely a localized condition, but that there was a general infection, and therefore, he was inclined to prefer the intravenous use of the tartar emetic to the simple outward application of the drug.

Circumscribed Deep Induration following Application of X-rays.

By E. G. GRAHAM LITTLE, M.D.

THE patient is a lady, aged 56. She suffered from uterine fibroids and a course of X-rays was given in the hope of reducing these. Eight exposures in all seem to have been made, over the lower abdomen, and

there are now four areas, about the size of the palm of a man's hand, in which a walnut pigmentation and a very slight degree of atrophy remain. The last exposure was made in March, and as the fibroids seemed unaltered, an operation was performed in March last, the uterus and the growths being removed. The wound healed without incident, and the scar left by it is perfectly sound and is separated from the present induration by a considerable area of healthy skin. About two months before she came to me, a thickening of the skin was noted in one of the pigmented areas left by X-raying, on the left of the midline of the abdomen. There does not seem to have been any definite burn, and the surface of the skin covering the thickened mass is unaltered except that there is some puckering at the upper end. There is no papillomatosis. The thickened portion involves the whole thickness of the skin but is movable on the underlying tissues, and an area of about 3 in. by 4 in. is affected, extending nearly from the level of the umbilicus to the pubes, but well to the left of the midline. This indurated area is very hard, feeling like fibrous tissue. None of the other pigmented areas show a similar change. I am entirely unfamiliar with this condition and shall be glad of any suggestions.

Sarcoids of the Darier-Roussy Type.

By E. G. GRAHAM LITTLE, M.D.

THE patient is a lady, aged 55: Bluish deep-seated nodular swellings develop from time to time, the first to be noted having appeared on the lobes of both ears about twelve months ago, with rapid extension of similar growths on the eyebrows, face and neck. Three months later similar lesions came out on the knuckles of both hands, especially on the left, and to a slighter degree on the toes. The nodule is obviously hypodermic, and the skin is unchanged over it, except for the alteration in colour. The lesions are remarkably uniform in size, averaging $\frac{1}{2}$ in. in diameter, and are very numerous, some twenty being present on the face alone. There has never been any ulceration or indeed any change in the tumour once they have developed, except that some improvement, apparently temporary, was noted as following a course of "yadil."

The lesions upon the knuckles are strongly reminiscent of some of my cases of granuloma annulare, except that they are uniformly reddened, and the granular ring is lacking. But the case seems to

4 Sequeira: *Carcinoma Cutis and Pre-cancerous Hyperkeratosis*

exhibit a sort of transition from sarcoids to granuloma annulare, which Darier is now inclined to group with sarcoids. I have not been able to obtain any material for histological investigation.

Carcinoma Cutis and Pre-cancerous Hyperkeratosis.

By J. H. SEQUEIRA, M.D.

THIS woman, aged 64, originally came under my care with a characteristic rodent ulcer on the forehead. This was treated by radium, and responded very well at first. In the intervals between the radium applications, while she was under observation, she developed a rapidly swelling growth on the right upper arm. This was excised. Professor Turnbull found it to be squamous carcinoma; he called it "a solid trabecular squamous-celled carcinoma." She had an enlarged gland in the axilla, and that was excised at the time, and proved to be purely inflammatory. The patient has several other lesions of a curious character on the lower part of the back. They are of long standing, and much resemble the lesions which have been present in certain cases which have been shown here, and which were thought to be multiple rodent ulcer. On one of these patches, which is now covered with a red scale, there has developed during the last two or three weeks a papillomatous growth, which we fear is also squamous-celled carcinoma. A portion of the edge of one of these large reddish plaques on the back has been cut, and it did not show the characters of basal-cell carcinoma. The report we had was, that there was much hyperkeratosis and a suspicion of malignancy—i.e., it was looked upon as pre-carcinomatous—an opinion given some time before the development of these large, rapidly-growing papillomatous masses. The case is interesting as showing the multiplicity of malignant growths on the skin of two types: one, apparently, a basal-cell carcinoma, the other a squamous-cell carcinoma.

In her younger days, the patient suffered from psoriasis; she had it thirty years, and was under treatment by medicine—presumably arsenic, and the question arises whether the old arsenical treatment had anything to do with the development of these tumours. So far as I can make out, there is no direct association of the lesions now present with the old psoriasis. We know malignant disease has developed on old psoriatic patches, but I do not remember that malignant disease has developed on areas occupied by psoriasis which has been cured.

DISCUSSION.

Dr. H. G. ADAMSON said that this was a very interesting case, and thought it was probably the first case of the kind shown in this country. He regarded it as pre-cancerous dermatosis of Bowen and Darier. Bowen first described the early patches, and predicted it was a pre-cancerous condition. Darier afterwards had a case in which a cancerous growth developed on the pre-cancerous patches. Darier took special interest in it because it was a dyskeratosis. In the patches there were downgrowths of the epithelium with keratosis in the centre, not unlike what was seen in *molluscum contagiosum*. Darier compared it with Paget's disease, with the difference that in Paget's disease there was no hyperkeratosis, but the surface of the epidermis was eaten away, and the keratotic bodies came to the surface. In the pre-cancerous dermatitis of Bowen they were embedded deeper and were associated with hyperkeratosis. He did not understand the association with basal-celled carcinoma. He did not know whether Dr. Sequeira saw the sections of the original tumour. These downgrowths might be mistaken for basal-celled tumour.

Dr. GRAHAM LITTLE thought this case should be classed with those of generalized rodent, of which he showed the first case there. Mrs. Savill's followed almost immediately, and there was a third case shown by Dr. Gray. The history in this case of perfectly typical rodent ulcer having preceded all the other manifestations seemed conclusive of that diagnosis. The very recent lesions were exactly like the early stages of what was seen in the cases referred to. The first stage in this condition was a pearly-white, hardly visible, swelling on the skin, of which this patient had one or two on the back. The history of previous psoriasis was very interesting: one of the cases he had alluded to had such a history, and Mrs. Savill's case had a history of preceding severe seborrhœa. The eruption of rodent tumours apparently followed very much the distribution of the preceding rash. In two of his cases there was spontaneous involution: tumours were described as having been present, and there was an atrophic patch in the position they had been described as occupying.

The PRESIDENT thought that the first case of Bowen's condition observed in this country was one published by Sir Lenthal Cheate in his diagrams of malignant disease following certain nerve areas. Many years ago Sir Lenthal showed him a case which they both thought was Paget's disease, and followed the area of the nerve segment. They cut several pieces out, and examined them histologically, and they classed the condition as anomalous Paget's disease: they had not seen it in that position before. Those slides were shown to Mr. Shattock, who saw in some no reason to believe it was Paget's disease. Others had thought were Paget's disease. It had much of the peculiar cell formation which was there present, and it had some hyperkeratosis, and the peculiar gyrate scalloped edge. He thought Bowen's pre-cancerous dermatosis was an anomalous form of Paget's disease.

Pemphigus Vegetans.

By HALDIN DAVIS, F.R.C.S.

THIS somewhat elderly woman has a long and rather indefinite history of sore throat, and a year ago she developed blisters in the mouth. During the last nine months she has been having lesions on the skin in the axilla, abdomen and back; nothing in the groin. The skin lesions are rather small flaccid bullæ, which become sore, and then heal up. She has pemphigus, but I may have to abandon the word "vegetans," because up to the present the bullæ have refused to vegetate. Nevertheless I regard the prognosis in her case as poor.

DISCUSSION.

Dr. GRAHAM LITTLE said he showed there two or three months ago a patient who for a year had had lesions on the mucosa of the mouth, and there only. During his early stay in hospital he showed very scanty pemphigoid bullæ. They developed rapidly, and he died last week of very extensive and intractable pemphigus vegetans. He had had another case, in a man whom he brought there a year ago with an eruption on the hands, which members very diversely diagnosed, the prevailing view being that it was lupus erythematosus. The President was the only one who suggested the correct diagnosis—namely, that an arsenical factor was present. Dr. Willcox found arsenic in the hair and nails. Subsequently he was admitted into St. Mary's Hospital, and he was there when the pemphigoid eruption developed. It began on the characteristic parts, the groin and axillæ, and it became very fetid, and so the patient was sent to his home, where he died of extensive and typical pemphigus. Whether the arsenic content had anything to do with the subsequent development he could not say, but in both cases the end came extraordinarily rapidly when the skin began to be attacked.

Dr. J. J. PRINGLE was inclined to favour Mr. Haldin Davis's opinion that this case would ultimately become a pemphigus vegetans. In one which he saw during the war, the appearances when he first saw it were similar to those in this case. The patient was removed from a military hospital to the Middlesex, and rapidly got extremely ill: when, to everybody's surprise, he began to get well—the disease was apparently arrested. For eight months he was in such comparatively good health that he was able to resume military duty, in the capacity of a clerk. At the end of that time, however, he had a relapse, and the disease which was quite intractable proved rapidly fatal in three or four months. Dr. Pringle did not know whether this possibility of the remittent character of the disease had been pointed out.

Dr. WILFRID FOX said he had had a similar case, the patient being a woman, aged about 35, who recovered after some years. She was shown by him at the old Dermatological Society of London when she had partly recovered. She showed both bullæ and vegetating growths in the axillæ and groin; there were also numerous bullæ scattered about the surface of the body. The mouth was affected, being in a very septic condition, and diarrhœa and hæmorrhage pointed to some infection of the intestinal tract. He gave a bad prognosis, as up to that time most of the cases had died, but fortunately for the patient she eventually recovered, and shortly after the date in question, several cases of a mild form of pemphigus vegetans were reported from America in which recovery had taken place. Various drugs were tried, but the two most potent factors in bringing about a recovery were the removal of her teeth and the excellent nursing which she had. After she left the hospital she attended his out-patient department for several years, during which time a single vegetating growth between the toes, about the size of a cherry, kept recurring at intervals, but eventually cleared up altogether.

Mr. HALDIN DAVIS (in reply) said that a similar case had been published in the *Bulletin* of the Johns Hopkins University. That case lasted ten years, and the patient was still alive after several bad attacks of vegetating lesions, followed by remissions.

Pityriasis Lichenoides.

By HALDIN DAVIS, F.R.C.S.

THIS boy, aged 11, is somewhat similar to a case I showed a few months ago as pityriasis lichenoides chronica of the parapsoriasis type. The special point on account of which he is shown is the extreme youth of the patient. He has had it ever since he was 3 months old.

Lichen Planus Annularis.

By H. C. SEMON, M.D.

THE patient, a man, aged 52, was first seen by Dr. Malcolm Simpson, at St. Paul's Hospital, two years ago. There was a single papulo-circinate eruption about the size of a sixpence on the glans penis. Clinically, Dr. Simpson believed it to be a case of lichen planus annularis, but in view of a definite history of primary chancre twenty-five years ago, and a weakly positive Wassermann reaction,

he ordered the usual two months' course of mercury and novarsenobillon, and under this treatment the local condition slowly cleared up.

Six months ago the patient again consulted him for a recurrence *in situ*, but on this occasion the Wassermann reaction was negative. A difference of opinion led Dr. Simpson to send the case to me at the Great Northern Hospital. In my absence during the summer it was diagnosed as tinea, and X-ray treatment was ordered, with the result that when the patient presented himself a week later on my return to the hospital, involution had already begun and has become complete to-day.

Purpura Annularis Telangiectodes.

By H. C. SEMON, M.D.

THIS man comes with a history of constantly recurring rheumatism, which began in 1914 when he enlisted. In 1915 he was discharged with aortic disease. For over six months he had had the lesions seen on the legs, annular purpuric petechiæ, with, here and there, small aneurysmal dilatations. I was unfamiliar with this eruption, but from the literature it seemed to correspond with a very rare condition known as purpura annularis telangiectodes, which Majocchi described in 1898,¹ and of which, in 1915, only thirty-eight cases had been described.

DISCUSSION.

Dr. J. J. PRINGLE said he had ventured to make the diagnosis of "Majocchi's disease" in one case practically identical with that exhibited, the only differences being that it was more distinctly reticular in pattern, and of a deeper purple colour. The patient was a very delicate woman, who had been grievously overworked during the war. The disease was unilateral, involving the left leg and thigh only. He did not know whether she had morbus cordis. He suggested that she should be put to bed, and he afterwards heard that the condition completely disappeared in two or three months. He believed that was not in accordance with the prognosis given by Majocchi.

Dr. F. PARKES WEBER said that in 1910 he had described² the case of a man, aged 28, who had been in a number of hospitals, and when he saw him,

¹ *Archiv. f. Dermat. u. Syph.*, 43 and 44, 1898.

² F. P. Weber, "Chronic Purpura of Two Years' Duration connected with Malignant Endocarditis, wrongly supposed to be connected with Splenic Anæmia," *Brit. Journ. Derm.*, Lond., 1910, xxii, p. 37.

late, he had endocarditis maligna lenta, of which he died. Purpura on both legs was a feature of his illness, and the enlargement of the spleen was remarkable. For that reason many supposed he had splenic anemia. The cardiac valvular disease in Dr. Semon's case made him think of that case.

Mycosis Fungoides.

By H. C. SEMON, M.D.

THIS man, aged 36, was sent to me two months ago. For the past eight to ten years he has had a succession of tumours in various parts of the skin of the whole body. They run a very definite course. About fourteen days after first appearing, ulceration commences and lasts about a week, at the end of which time healing sets in, and is complete in another fourteen days. Pain is absent. There is usually one to three months' interval between the crops, and his general health does not appear to be much affected. There is a seborrhœic eczema on both legs which has persisted on both ankles for eight years. In 1918, of three blood examinations for the Wassermann reaction two were positive and one negative.

Five injections of galy, and a course of mercury pills did not have any appreciable effect, either in preventing ulceration, or delaying a succeeding tumour.

When seen by me two months ago, the whole of the left upper eyelid was occupied by a flat-topped ulcer, which at first glance closely resembled a Hunterian chancre. Absence of induration was marked, however, and there were no glands to be felt. Under the local application of boric ointment healing occurred within ten days, and all that is left of the condition to-day is a soft infiltration involving only the thin outer skin of the eyelid, and not at all hindering the closure or opening of the eye.

The associated "eczema" on the shins, and ankles, forearms, palms, and sides of the neck is of the dry type, and appears to have a softly infiltrated character not unlike the dermatitis I have seen in cases of obvious mycosis fungoides. A clinical point against such a diagnosis is the absence of itching, which is well marked in the early stages of this grave malady.

I made a biopsy, which shows infiltration of the whole corium with ordinary round cells, and others of various types. At the present time the Wassermann is negative. The growth on the lid has not been

subjected to microscopical examination, because if there were subsequent interference with the action of the lid it might be attributed to the biopsy. A blood count showed no abnormality.

Leukæmia with Cutaneous Nodules.

By H. W. BARBER, M.B.

Two months ago the patient appeared with an ulcer on the scalp, which at that time suggested the diagnosis of tertiary syphilis. He also had a bluish nodule on the left cheek, and some enlarged glands in the neck. I thought the nodule was probably a melanoma. I took him into hospital, and found his Wassermann was negative. He was given salvarsan, but this had no effect upon the ulcer. Blue nodules later appeared on the chest and elsewhere. When a blood count was done, he was found to have lymphatic leukæmia, with a total leucocyte count of nearly 400,000. The blood smears show that about 70 per cent. of the white cells are of a very primitive type, and the small lymphocytes are only 6 per cent. I have only seen three similar cases, but in all of them the leukæmia was of this type. The man has slight enlargement of spleen and liver, some ascites, and signs of pressure on the bronchi, presumably from enlarged bronchial glands.

Case of Multiple Idiopathic Hæmorrhagic Sarcoma.

By J. L. BUNCH, M.D., D.Sc.

THE patient is an Englishman, aged 30, and works in a glass refining factory. Some lesions appeared on the dorsum of the right foot six to seven years ago, followed by similar lesions below the internal malleolus on the same side. Later, similar lesions appeared on the dorsum of the left foot and on the left ankle. These lesions were first brownish, then purple, and then they became indurated. On the dorsum of the second and third toes of the left foot are some prominent, soft, purple, vascular growths, about the size of a pea. There is an indurated, larger, purple patch on the dorsum of the left foot, which has recently ulcerated, and the pain, which has always been considerable, is now much accentuated. The patient was shown here two years ago by Dr. Pringle, but at that time there was no ulceration.

I am of opinion that the best chance we can offer the man is to have the part thoroughly X-rayed. Not only do I think that it will cure the ulcer, but that it will remove much of the induration of the nodules on his toes.

Dr. PRINGLE said that the report of the Sub-committee which examined this case in 1918, and a similar one in 1919, had been published in full, and, on the whole, it bore out his provisional diagnosis of "the *miscalled* hæmorrhagic sarcoma" of Kaposi. The progress of the case now shown undoubtedly confirmed the opinion he then formed of it, and it was worth while to accentuate the fact he used at the time as a clinical argument against the diagnosis of "Schamberg's disease"—viz., that this was a condition which did not extend by progressive vascular extension at the margin, but by discrete, outlying, completely separated vascular growths, quite outside the main body of the disease. It was, however, mainly on the ground of the microscopical examination of these vascular growths made by Dr. MacCormac that the Sub-committee confirmed his provisional diagnosis of "the *miscalled* multiple sarcoma"¹ in both cases.

Case of Parakeratosis Variegata.

By E. G. GRAHAM LITTLE, M.D.

THE patient is a young girl, aged 20. The history given is that at the age of 5 she had an attack of measles, the eruption so diagnosed passing insensibly into the condition now seen. This history of acute onset, suggesting an exanthem in the first phase of eruption, is exactly paralleled by a previous case of parakeratosis reported by me here, also in a young girl.

At the present time, the whole surface of the skin, of the hands, forearms, feet and thighs is covered by a lichenoid, finely scaly, very red eruption in continuous sheet-like invasion, ceasing somewhat abruptly on the limbs at the upper margins. The skin of the back is also faintly involved, being however much less pink, although showing the fine scaliness. The cheeks are smooth, but covered with telangiectases. The nails are unaltered. The mucosæ of mouth and vulva are free. The breath is very foul, and the teeth are in an execrable condition. Otherwise she seems perfectly healthy and robust. She has undergone many treatments, without the slightest benefit.

¹ See *Proc. Roy. Soc. Med.*, July, 1918 (Sect. Derm.), pp. 107 *et seq.*, with illustrations, and May, 1919, with Report of Pathological Sub-committee; also *Brit. Journ. Derm.*, 1918, xxx, p. 179, and *ibid.*, 1919, xxxi, p. 143 *et seq.*

Dr. LESLIE ROBERTS (Liverpool) said that he regarded the case as one of great interest as illustrating the effects of environment on a congenitally defective epidermis. The vice of cornification was not merely confined to the arms; if the pale "non-eruptive" parts were examined with a lens they showed the abnormal formation of the cuticle. This was defective both in keratine and hyaline matter. The telangiectatic feature he regarded as due to the action of light and air on the endothelium of the capillaries. This effect was most marked on the cheeks, on the neck, and the front of the chest corresponding to the V-shaped opening of the dress. Examination of the patient's mother showed an abnormality of cuticle similar to the daughter's, but very slightly developed.

Case of Post-vaccinal Psoriasis.

By GEORGE PERNET, M.D.

THE patient is a girl, aged 16, who was vaccinated in two places just below the insertion of the left deltoid four months ago: this was a primary vaccination, as she had not been vaccinated in infancy. Two months later, while the scabs were still present on the vaccinated areas, the present psoriasis outbreak appeared. Round the two recently scarred vaccination areas, each $\frac{3}{4}$ in. in diameter, there were two concentric rings of scaly psoriasis papules, one immediately round the borders of the scars, and one a little farther out. The latter rings had coalesced, forming a transverse figure of eight. The extensor surfaces of the forearms and hands exhibited profuse psoriasis more or less *en nappe*. The elbows were also involved; and on the fronts of the knees a few discrete typical small nummular lesions were present. At the time of the vaccination process, all the finger tips festered, but this had cleared up. Both the girl and her mother asserted there had never been any trace of a rash before the vaccination.

DISCUSSION.

Dr. S. E. DORE said that psoriasis sometimes occurred for the first time after slight injuries, and it was possible that this might explain its occurrence after vaccination.

Dr. WILFRID FOX said he had seen a similar thing in a medical man practising in Ceylon, who had been revaccinated on account of an outbreak of small-pox. He had never had psoriasis before, but after the vaccination psoriasis started around the points of inoculation, spread down the arm and eventually all over the body. It was so intractable that he had to give up practice and come home.

Case for Diagnosis.

By S. E. DORE, M.D.

THIS girl was seen for the first time two days ago, and it had not been possible to watch the evolution of the lesions or the results of treatment. She had had an eruption of small closely aggregated follicular papules about the size of a pin's head, leaving small scars with a few pustules on the forehead, cheeks and chin for nine months. Its onset was preceded by flushing of the face for about three months and there were some symptoms of rosacea at the present time. On pressure under a glass the lesions showed definite brown points similar to the deposit seen in lupus vulgaris, and the exhibitor's view had been that the condition was allied to the acnitis of Barthelémy, Radcliffe Crocker's acne agminata, or the disseminated follicular lupus of Tilbury Fox which Dr. Oliver and others had shown to be distinct from the tuberculides. Dr. Pringle, however, claimed it to be an instance of the eruption he described under the name of "a rare seborrhoïde of the face" and the characters of the eruption and the associated symptoms of rosacea appeared to confirm this diagnosis.

Dr. PRINGLE regarded the case as a good example of a comparatively mild form of the condition he described in the *British Journal of Dermatology*,¹ under the title of "a peculiar seborrhoïde." The paper was accompanied by a coloured illustration of a severe case, and a schematic drawing of the microscopical appearances. Although his name had thus been associated with the condition he disclaimed the honour of having first observed it, or of having first identified it as a clinical entity. For Dr. Colcott Fox had brought a well marked case before the old Dermatological Society of London as far back as 1894,² and a case published many years ago by Professor Petrini (at Galatz), had been regarded in some quarters as an exaggerated form of the disease, which had been recognized by many recent American writers. Almost all cases of this peculiar form of sebaceous disorder affecting the face had a history of antecedent dyspepsia and rosacea, and its characters became much more manifest when the rosaceous element had been removed by treatment. The primary lesions were slightly elevated on reddish or slightly shiny papules, and the microscopic findings by Dr. Graham Little, then clinical assistant in Dr. Pringle's first case, which showed dense and deep cellular infiltration round the pilo-sebaceous apparatus, explained the appearance of brownish lupoid-looking

¹ *Brit. Journ. Derm.*, 1903, xv, p. 41 *et seq.*

² *Ibid.*, 1894, vi, p. 368.

nodules in the skin on diascopy, which often gave rise to erroneous diagnosis. They also accounted for the shallow pitting or atrophy of the skin which followed the absorption of the infiltrate, but which was only temporary. It was to be noted that these elementary lesions were present in greater or less abundance in nearly every form of sebaceous disease of the face, especially of acne on a rosaceous basis : it was only in exceptional cases like the present, on which the peculiar primary lesion was present in super-abundance or almost exclusively, that the clinical type was to be recognized. The first step towards a cure was the removal of dyspepsia and rosacea, and the rest of the disease was almost invariably rapidly cured by a weak sulphur-resorcin paste.

Case for Diagnosis.

By S. E. DORE, M.D.

THIS child, aged 9, has an eruption on the face, arms and legs, which has been present in an acute form for six months with slight attacks in the summer for five years previously. She was handed over to me as a case of staphylococcic infection, and a few weeks ago the arms and legs were covered with pustules. Now, as a result of antiseptic applications, it has been reduced to its present form. The initial lesion is a deep vesicle, which becomes pustular and leaves a small pitted scar. The eruption is mainly on the exposed parts, and is definitely affected by sun and heat, particularly heat. I regard it as an example of hydroa aestivale. She is being treated with quinine ointment and quinine powder, according to Darier's prescription, with a view to intercepting the chemical rays of the sun, but the condition cannot be entirely attributed to ultra-violet rays because it is, like most of the cases, excited by heat and by cold winds. One area of the leg was treated by ultra-violet rays, and instead of being aggravated the eruption had decidedly improved.

DISCUSSION.

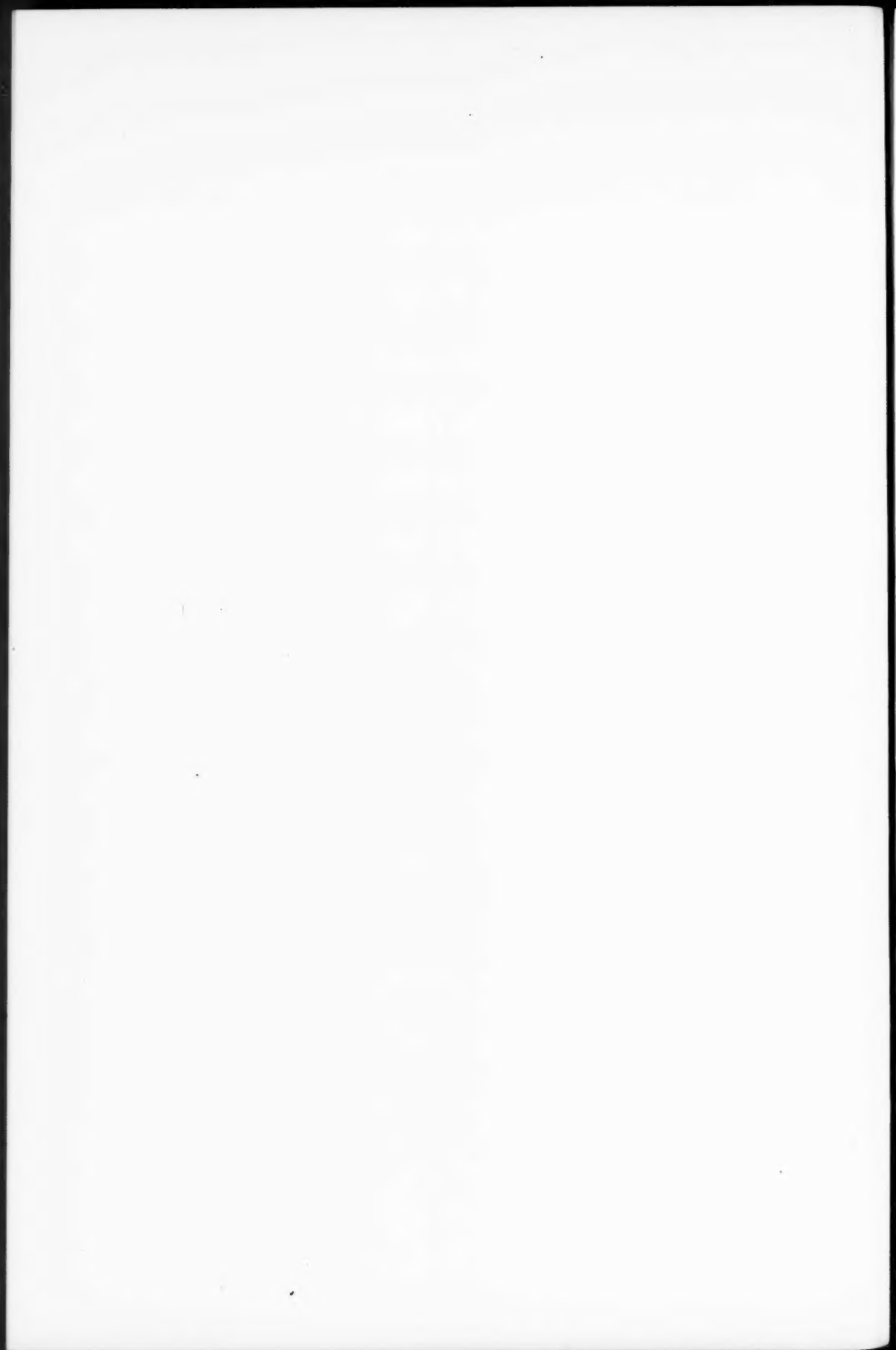
The PRESIDENT considered most of these cases of solar eczema to be due to some focal sepsis, and cases similar to this he had not classified as hydroa aestivale. One patient had it until she was aged 16. She was admitted into hospital, the septic tonsils and adenoids were cleared out, and she was well for two years ; she had never had such a period of freedom before. At the end of the two years some teeth became septic, and in extracting them, more were taken out at a sitting than she could properly stand, and then the rash came out again. It had now practically disappeared. It was rare to find solar

eczemas in infants. If it was a peculiar condition innate in the skin, it ought to be congenital, but in the majority of cases it was not so.

Dr. SEMON asked if Dr. Dore had examined the urine spectroscopically for hæmatoporphyrinuria. It was said that a large number of cases of hydroa aestivale had that condition, and it had been produced in rabbits in the inverse way, i.e., they had been fed on something which gave them hæmatoporphyrinuria, and exposure to light caused them to develop these lesions. As a matter of fact it killed mice. He had examined the urine in these cases, but hæmatoporphyrin had not been found.

Dr. DORE (in reply) said he had not examined the urine, but was familiar with the observations mentioned by Dr. Semon and would have it tested for hæmatoporphyrin.¹ There were no other children in the family similarly affected. In his experience these cases and those of solar eczema were very difficult to deal with, as complete protection from sun and heat was almost impracticable.

¹ McCall Anderson, *Brit. Journ. Derm.*, January, 1898, p. 1, described two cases of hydroa aestivale in brothers in whom the urine was of a Burgundy-red colour during the attacks owing to the presence of hæmatoporphyrin.



Section of Dermatology.

President—Dr. ARTHUR WHITFIELD.

Case of Urticaria Pigmentosa with Bullous Lesions.¹

By J. M. H. MACLEOD, M.D.

THE patient is a boy (first-born), aged 9 months, born at full time, and breast-fed. There is no history of any such skin disease in the parents. The disease appeared at the age of 3 months. The eruption is acute and the case belongs to the mixed type of urticaria pigmentosa as both macular and nodular lesions are present. The eruption came out first on the back, then spread over the body, and has been increasing ever since, new lesions tending to come out in crops. It is now widely distributed over the whole cutaneous surface excepting the palms and soles, but including the scalp, and is especially profuse on the trunk and proximal parts of the limbs. There are no lesions on the mucous membranes. Some of the lesions are not palpable, while others are definitely raised; they are pale fawn in colour, irregular in outline, and vary in size up to patches or plaques several inches across. The skin over the lesions does not present the "shagreenated" appearance which occurs sometimes in cases of this disease. In addition to the more typical lesions there are variously sized wheals which are whitish and surrounded by pinkish halos, and vesicles and bullæ are present varying in size from a split-pea to blebs an inch in diameter. The initial lesion appears to be either a wheal or a bulla.

When the case was first seen at the Victoria Hospital for Children, only wheals, macules and plaques were visible, but a month later bullæ had appeared. When I first saw the patient the bullæ were present and the pronounced urticarial element so masked the pigmentation that I thought at first it might be simply a case of ordinary bullous

¹ At a meeting of the Section, held November 18, 1920.

urticaria. The lesions cause much itching, especially at night, and there is well-marked dermatographism. There is no general glandular enlargement. In spite of the extent of the eruption the child's general health appears to be excellent.

A piece of tissue from a raised faintly pigmented lesion on the side of the abdomen was excised for microscopical examination. The sections were stained by the polychrome methylene blue method and were quite characteristic of urticaria pigmentosa. The epidermis was somewhat stretched and pigment granules were present here and there in the cells of the basal layer and its neighbourhood. In the corium there was an infiltration, consisting mainly of mast-cells, densest in the subpapillary layer and becoming more sparse towards the lower part of the rete. The cells were found chiefly around the blood capillaries and varied in shape and size, some being fusiform, others cuboidal. The collagen bundles were separated by oedema and here and there were broken up and formed spaces in which the mast-cells were deposited.

The special interest of the case is the occurrence of the bullous lesions; this I have never actually seen before, though I know it has been observed. The acuteness of the eruption points to a toxic rather than a nævoid condition and suggests the possibility of the disease being due to some foreign protein which was responsible for the urticaria, the bullæ, the pigmentation, and the peculiar cellular infiltration of mast-cells. In cases of this type Sangster's name of "urticaria pigmentosa" is more applicable than Tilbury Fox's term "xanthelasmaidea."

DISCUSSION.

Dr. GRAHAM LITTLE considered the case unique; he had never seen an instance of bullous urticaria pigmentosa. The sections, however, were sufficient to establish the diagnosis. Had any members seen urticaria pigmentosa without mast-cells? Sutton had described such cases, but he (the speaker) regarded the presence of mast-cells as essential to the diagnosis.

The PRESIDENT agreed with Dr. Little's remark concerning the diagnostic value of mast-cells. He had always believed there were two diseases in children somewhat in the same class; one was urticaria pigmentosa, the other an ordinary urticaria which left a little pigment on disappearance. The difference lay in the infiltrative character of the lesion in true urticaria pigmentosa. If anyone suggested to him that a condition was urticaria pigmentosa and there were found no mast-cells, he would suggest a revision of the diagnosis.

Dr. MACLEOD (in reply) confirmed what the President said. It was not until he found mast-cells in the tissue that he arrived at the diagnosis of urticaria pigmentosa with bullous lesions. He regarded mast-cells as pathognomonic of urticaria pigmentosa.

Case of Epidermolysis Bullosa with Epidermal Cysts.

By J. H. SEQUEIRA, M.D.

THIS patient illustrates a late stage of a case of this rare disease. Many of the older members of the Section will remember a woman suffering from severe epidermolysis bullosa, which had completely incapacitated her, so much so that the greater part of her life had been passed in hospitals and infirmaries, and many of our colleagues, as well as myself, had had her under our care. The patient now shown is an example of a less severe type. He was originally shown by me at a meeting of the Dermatological Society of London, in 1904.¹

The history now given by the patient (who is aged 20) is that ever since he was seen in 1904 he had had blisters varying in size from a threepenny piece to a five-shilling piece, and these have usually left scars. There are now large red cicatricial areas of fine papery consistence on the buttocks, shoulder and limbs. There are a few bullæ and areas of recent blebs covered with dry crust. The finger-nails are in the same dystrophic condition, and the epidermic cysts are still present in large numbers. The teeth are good. During the past five years there has been gradual improvement, the blebs appearing less frequently. There is little discomfort except when the bullæ become infected or "fester" as described by the patient. He had nephritis with anasarca on two occasions in 1918 but the urine is now free from albumin. The Wassermann reaction (August 25, 1920, and September 29, 1920) was negative. An examination of the blood showed no abnormality. Sections of a hæmorrhagic bleb showed that the horny and granular layers of the epidermis had been stripped off the subjacent skin by blood.

It is important to note that though the patient has never been able to do manual labour he has been earning his living by clerical work.

¹ *Brit. Journ. of Derm.*, 1904, xvi, p. 460.

Case of *Pityriasis Rubra Pilaris*.

By S. E. DORE, M.D.

I SENT in the description as psoriasis associated with follicular ichthyosis, as, when I first saw the case, the scaling was very marked and the follicular involvement was not so apparent. In a recent paper¹ on psoriasis it is stated that there are less than ten cases on record in which the affection began under the age of $2\frac{1}{2}$ years, and the same is probably true of pityriasis rubra pilaris. This child is aged $3\frac{1}{2}$, and scaly patches, followed by a nutmeg-grater condition of the skin, was first noticed about six months ago. There are numerous scaly patches on the trunk and limbs, and marked prominence of the follicles on the extensor surfaces of the arms and legs. The horny plugs generally present on the back of the phalanges in adults are absent. The scalp and palms are dry and scaly, and the nails, especially of the toes, are thickened and striated. The child was born in India and had recently lived in Australia. The mother suffered from leucoderma of old standing, and an uncle is said to have had psoriasis. A brother and a sister are healthy.

DISCUSSION.

Dr. H. G. ADAMSON considered that there might be a close relationship between pityriasis rubra pilaris and psoriasis. Several cases shown before the Section as pityriasis rubra pilaris had had psoriasis, or other members of the family had been subject to psoriasis, and he had a similar case in which the condition alternated with psoriasis. The two conditions behaved in much the same way, disappearing and coming again.

Dr. J. H. SEQUEIRA said he was able to endorse Dr. Adamson's remarks. Some years ago he had a case in which the eruption was at one time characteristic psoriasis and at another pityriasis rubra pilaris.

The PRESIDENT found some difficulty in endorsing Dr. Adamson's view, because there were great differences between the two conditions, though he agreed pityriasis rubra was probably related to psoriasis. They showed a quite different response to treatment. One very bad case he showed to the Dermatological Society of London six times; he had the patient under treatment for many years, and no form of treatment modified the eruption in the

¹ C. M. O'Brien, *Med. Press and Circ.*, September 15, 1920, p. 208.

slightest. It was rare for attacks of pityriasis rubra pilaris to get well in weeks; they generally hung fire for about a year or more, and then faded slowly away.

Dr. SIBLEY reminded members of the case of a boy, aged 6, whom he showed in June, 1913, with typical pityriasis rubra pilaris, and the opinion expressed by many members was that he had both pityriasis rubra pilaris and psoriasis. However, the condition cleared up in a few weeks; except for a marked prominence of the hair follicles over the sacral region, the whole skin appeared to be more or less normal. A few months after that the patient returned with a very acute guttate psoriasis, which covered him from head to foot.

Case for Diagnosis.

By E. G. GRAHAM LITTLE, M.D.

THE patient, a lady aged 47, has been under Dr. Dore's care as well as my own. Her eruption began last May, and came out in increasing large patches, and at more frequent intervals, and there is little if any recession in response to treatment. It is very extensive in distribution, itching fiercely; she seldom has two hours' continuous rest from it. There is also some tenderness in the patches, not as a result of treatment, as it was present when there was no treatment. The disease is not strikingly present on the scalp, though her head is scurfy. She has had many illnesses, some of them septic, and that fact perhaps confirms the President's idea of some septic-focus causation. Possibly this is a premycotic condition, which is so difficult to distinguish, in the early stages, from eczemas and like conditions. I ask for suggestions.

DISCUSSION.

The PRESIDENT thought this was a case of what he was in the habit of labelling "flexural eczema"; it invaded the neck, front of arms, axillæ, groins, &c., and was probably due to some focal infection or intestinal toxæmia. If the specific cause was discovered, a cure of the skin condition followed treatment on that line. It was apparently identical with what the Americans called "acute infectious dermatitis." It was not infectious in the ordinary acceptation of that term, and it was not acute. The Americans put it down to a focal infection. In some cases the source of the trouble was in the teeth, in others in the tonsils; in fact one had to send the patients round to all the specialists, except the ophthalmic, for an investigation until the point was decided. Some patients were found to have a gynecological trouble. He had

investigated a number of cases from the point of view of indicanuria and urobilinuria, and a fair proportion gave a strong test for indican. He had one such patient recently, and she was now doing well: in her case the trouble was identified by the dentist, who found an apical abscess in the tooth.

Dr. S. E. DORE said this patient consulted him twice in the summer, and he regarded the condition as acute erythematous eczema, but the condition did not respond to treatment. At present he did not see anything about the case suggesting mycosis fungoides, but members were acquainted with the mimicry of the premycotic stage of that disease, and a chronic skin affection of that nature which did not clear up warranted the suspicion that it might be the premycotic stage of mycosis fungoides. He instanced one case in which Dr. Whitfield, Sir Malcolm Morris and himself had made a definite diagnosis of psoriasis, and later the patient developed tumours, and became a typical case of mycosis fungoides.

Case of (?) *Kaposi's Hæmorrhagic Sarcoma* or *Schamberg's Disease*.

By E. G. GRAHAM LITTLE, M.D.

Two years ago I showed this lady as probably a case of *Kaposi's hæmorrhagic sarcoma*. In the interval, during which she has been under my observation, there has been no material change, except that in some parts of the leg the thickened patches have become more normal. When she was first shown, one suggestion made was that the dark pigmentation resembled that of *Schamberg's disease*. I noted the suggestion, and I do not now feel sure that the case is one of *Kaposi's disease*; she has had it for sixteen years with little or no change. The pigmentation involves only the one leg, and is of a deep walnut brown, distributed in small round spots the size of a split pea, with no nodular growth or ulceration at any time. The patient remains in excellent health.

Case for Diagnosis.

By A. WHITFIELD, M.D. (President).

THE case of this boy, aged 8½, was very difficult to diagnose when first seen. His general health is very fair. Since he was a baby he has had a cough, and for sixteen months he has been under dispensary treatment. There is no wasting, nor traceable signs of tubercle.

Three years ago an eruption began on the left shoulder, and the story is that since the commencement of the eruption no lesion has disappeared. The type of lesion is a distinctly infiltrated, tough, hemp-seed-like papule, with practically no divergence from the normal colour of the skin. It may be a very slow, benign tuberculosis, or it may be a slightly hyperkeratotic morphea, such as I have seen with a similar aspect. A biopsy has been done, and I do not think anyone familiar with cutaneous histology can doubt that it is typical lichen planus, a diagnosis which did not occur to me when I saw the patient, or if it did occur, I did not lay any stress upon it.

DISCUSSION.

Dr. H. G. ADAMSON said when he first saw the patient that day he had made the diagnosis of lichen scrofulosorum. The elementary lesion was follicular, the scaly patch consisting of a group of follicular papules. He now agreed with Dr. Whitfield that the correct diagnosis was lichen spinulosus; the microscopical section excluded lichen scrofulosorum. He thought the President's case very well illustrated the association of lichen spinulosus with lichen planus. It was his experience that lichen spinulosus in adults was always associated with lichen planus. The two eruptions occurred together or one followed the other. The reason why lichen spinulosus was not often seen with lichen planus in children was that the latter eruption was rare in children. But Dr. MacLeod showed, in a little girl, lichen planus and lichen spinulosus, a very good illustration of the connexion between the two.

The PRESIDENT, in reply, said he agreed with Dr. Adamson's remarks, in fact he believed he was the only one who supported that gentleman's contention that lichen spinulosus was generally lichen planus. He (the President) further held that practically all cases of verrucose lichen—which this was—arose not from the plane lesions but from the follicular. First there was a follicular lesion, with a little horn, then a group, and the hyperkeratosis spread in between, and the horns fell out, leaving a "pumice-stone" appearance—lichen verrucosus. The present was a very unusual verrucose lichen.

Case of Dercum's Disease.

By HENRY MACCORMAC, C.B.E., M.D.

THE patient, a married woman, aged 37, states that she enjoyed good health until three years ago, when the present condition first developed. No other member of the family is similarly affected. The

history is as follows: When first noticed the lesions were about the size of a small pea; they increased gradually to the dimensions of a walnut; they are tender and painful, these sensations varying in degree from time to time. No other abnormal condition is discoverable.

While this condition does not correspond to the disease originally described by Dercum, it may with justice be placed in the more extended conception of *adiposis dolorosa*. Vitaut's classification, which would include cases of this type, is as follows: nodular (encapsuled); diffuse, localized; and diffuse, generalized; I. P. Lyon,¹ goes even further, and with some success seeks to show that the several clinical groups of fatty deposit are not only closely related but essentially identical, being only variations of a common morbid process.

One tumour about the size of a hazel nut was removed from the forearm. Sections prepared from this consist of pure fat; in preparations stained by Levaditi's method nerve filaments were not found.

DISCUSSION.

Dr. F. PARKES WEBER asked why this should not be called a case of ordinary multiple nodular subcutaneous lipomata, which was a relatively common condition. The lipomata in this case he would not regard as really tender, especially in view of the prevalence of rheumatoid pains in women. These tumours were often found at a stage when the ordinary fatty tissue of the body was inclined to atrophy, though this patient had not yet arrived at that stage. Tenderness in such lipomata might be due to the stretching of a nerve filament around the tumour.

Dr. GRAHAM LITTLE deprecated so loose a classification as that suggested, which would practically merge all deposits of fat in one formless group of no clinical value.

Two Cases of Psoriasis treated by Danysz's Method.

By H. W. BARBER, M.B.

I HAVE brought these cases of chronic psoriasis because they seem to illustrate the effect of Danysz's method of treatment. One should be very careful before accepting the alleged value of a new treatment for psoriasis; I believe that an experience of at least five years is neces-

¹ I. P. Lyon, *Arch. Int. Med.*, 1910, vi, p. 28.

sary before a definite opinion can be formed. The cases quoted in Danysz's book (*"Origine, Evolution et Traitement des Maladies chroniques non-contagieuses"*) are very striking, and a study of them has led me to try the method myself. Danysz regards psoriasis, certain forms of eczema, urticaria, angio-neurotic oedema, and other non-cutaneous diseases, such as asthma, chronic albuminuria, and many gastro-intestinal disorders, as due to a state of "immunity-anaphylaxis." There is some experimental work in support of this view, for if rabbits are injected repeatedly with minute doses of a foreign serum or bacterial protein for several weeks, and are then kept under observation, they gradually develop chronic diseases of various kinds, such as arthritis, dermatoses with alopecia, paralysis, and so on. The same is true of horses used for the preparation of curative sera.

Acting on this theory Danysz attempts to counteract the anaphylactic state by giving repeated doses at short intervals of bacterial protein prepared from faecal cultures; the bacteria being killed at 70° C., the preparations are less toxic than ordinary vaccines, and can be injected daily or every other day. The method is comparable with the injection of peptone, of non-specific protein such as milk, and of food, animal, or plant proteins in the treatment of asthma.

Case I.—Male, aged 54. One sister also has psoriasis. The disease appeared in him at the age of 11. He was in Great Ormond Street Hospital when aged 13, and was treated by the external application of liquid tar. He was then free from the eruption for some years. At the age of 20 he came under Sir Cooper Perry's care, and was given arsenic in increasing doses. He was then much better for a period of some fifteen years. His present attack began eighteen months ago, and he became progressively worse. He came under my care in August, 1920. Treatment by Danysz's method was begun on October 5. At that time there was extensive psoriasis involving chiefly the arms, legs, and abdomen. He was given a course of twelve injections over a period of three weeks; this resulted in very great improvement, the patches becoming first pale and then gradually fading. After a week's rest a second course was begun, of which he had now had four injections. Only traces of the eruption now remained, and the patient stated that he felt in very much better health than before. In this case autogenous faecal vaccine was employed.

Case II.—Female, aged 37. Her grandfather had psoriasis. The eruption appeared in her at the age of 26. She was under treatment for several years without any lasting benefit; in fact, she has never been really free of the disease for eleven years. I myself tried increasing doses of arsenic, as well as various local applications. I also gave her intramuscular injections of sulphur in oil with only slight benefit. Treatment by Danysz's method was begun on

September 30, 1920, and she received twelve injections over a period of four weeks. The eruption disappeared rapidly, and she is now better than she has been since the commencement of the disease. In her case faecal vaccine prepared from another patient with psoriasis was used.

DISCUSSION.

Dr. COPE (introduced by Dr. Wilfrid Fox) said he had taken considerable interest in Danysz's method, through the work on asthma which he (the speaker) had been doing, and testing the skin of sensitive people. He did not think Danysz attributed the conditions named entirely to intestinal toxæmia, but he gave antigens, as other people gave peptones, to destroy any excess of anti-body which might be present. Danysz treated practically every condition by this method, and these cases quickly yielded to it, especially old-standing cases of eczema. Patients with eczema stood enormous doses without harm. The results of this method must be judged by an inspection of the state of the patients that have undergone it, after the lapse of some years.

Dr. S. E. DORE said he thought these cases were encouraging. He had a series of cases of psoriasis under stock vaccine treatment, but it was too early yet to report on them. He had read a commentary on this treatment by Sabouraud, who gave a very guarded opinion of its value; he said some of the cases showed a remarkable and even an apparently lasting improvement, but none of them seemed to be really cured and in some there were no results. Experience showed that the intestinal flora of patients with psoriasis was the same as in healthy persons, and stock vaccines could be used.

The PRESIDENT said he had not tried Danysz's method in psoriasis, because, as a rule, that disease did not present great difficulty, but, on Danysz's recommendation, he tried it in a bad case of dermatitis herpetiformis, and it did no good whatever. Sir James Galloway some time ago showed a case of psoriasis which had been cured, temporarily, by staphylococcic vaccine which had been cultivated from the patient's own scales. About a year later the eruption recurred, and that time it failed to be benefited by staphylococcic inoculations. It was known that psoriasis was not due to staphylococcic invasion of the surface, so that in that case the staphylococcus must have been an accidental incursion.

Case of Local Leishmaniasis.

By T. P. BEDDOES, F.R.C.S.

THE patient has a single patch of Leishmaniasis. These patches, in my opinion, have healed up entirely under local treatment by a 2 per cent. antimony ointment. I agree that intravenous injections

of antimony always succeed, but as this method is so tedious and troublesome, it is desirable to employ a simpler method if equally efficacious.

DISCUSSION.

Dr. BARBER said he had treated four such cases with a 5 per cent. ointment of tartar emetic. The ointment caused a good deal of inflammatory reaction, but the sores healed up completely. Dr. Castellani, when showing a case at the last meeting, raised the question as to whether in these cases one was dealing with a purely local disease or whether the blood stream was invaded by the organisms. He (Dr. Barber) had one patient, an officer, who had several Baghdad boils when he was in Baghdad, and developed a fresh one while on his way home to England; this case seemed, perhaps, to support the latter view.

Dr. J. H. STOWERS said that careful consideration must be given to the site of the lesion if powerful local remedies were used. The sores on the cheek of the patient recently exhibited by him were unsuitable for strong caustics owing to their proximity to the lower eyelid. When the lesions occurred on the extremities the question of ultimate disfigurement was of limited importance. As the specific organism existed in the blood general as well as local remedies were needed to cure the disease.

Dr. H. C. SEMON, referring to the statement that X-rays cured these cases, spoke of two cases which Dr. Barber and he had had in France—proved microscopically to be Delhi boil—one of which was treated by X-rays, while the other simply had a little boric acid dressing. The X-ray treatment was continued six weeks, and both cleared up at about the same time. Their conclusion, therefore, was that the rays had had no effect.

Mr. BEDDOES replied that the ointment did cause a good deal of local reaction if continued, but that if given for a fortnight when there was no appearance of improvement and then omitted and the sore allowed to heal, there was complete recovery. One should endeavour to determine whether all the parasites had been killed or no, and, if required, another week's or fortnight's treatment could be given later.

Case of Schamberg's Disease.

By E. G. GRAHAM LITTLE, M.D.

THE patient is a man aged 45. He has a brown to buff pigmentation of the legs in patches, the highest patch being just above the inner side of the knee on both sides. There are several patches each of the

size of about 2 in. by $2\frac{1}{2}$ in., roughly symmetrical between the knee and ankle. He has had this attack twelve months, but he describes a similar pigmentation as having been present seven years ago. At first there were no subjective symptoms, but now there is decided itching.

Section of Dermatology.

President—Dr. ARTHUR WHITFIELD.

Cases after Operation for Extensive Hairy Moles of the Face.¹

By H. S. SOUTTAR, F.R.C.S.

I OWE the cases which I am showing you this evening to Dr. Sequeira. The moles were very extensive, involving in each case the whole of the cheek and the lower eyelid. In two cases they extended on to the forehead. The replacement of such moles by Thiersch grafts would only result in the production of a scar, and the problem which had to be faced was that of substituting an area of whole skin from elsewhere. The arm flap method was adopted. A large flap was turned up from the shoulder, using the outer part as a pedicle, the arm was brought across the head, which was turned towards the flap, and the flap was sutured into position with the greatest accuracy. The flap was in each case cut of considerably greater area than that of the skin to be replaced, to allow for shrinkage and to avoid a possible ectropion due to traction on the eyelid. It might have been better to leave the eyelid untouched, so difficult is it to avoid a troublesome ectropion if this part of the mole is removed. The pigment in the eyelid could be removed by other methods. The arm was kept bound over the head for a week, and after that the pedicle was divided, and the suture completed.

It will be noted how exactly the grafted skin takes the qualities of the normal skin of the part. To obtain this result the subcutaneous musculature must not be interfered with. If this is preserved the skin develops the normal folds, and even the actual texture of the normal skin. The cutaneous sensation becomes perfect within two years, and within about the same time the neurovascular control is regained, with the result that blushing and blanching take place on both sides in an exactly similar manner. Not only so, but they are similarly distributed,

¹ At a meeting of the Section, held December 16, 1920.

and the malar flush again becomes noticeable. It is a curious and useful feature that in all the cases with which I have so far dealt, the lower margin of the mole has followed the naso-labial fold, in which a scar can be more easily concealed.

The arm flap method gives satisfactory results in children, to whom the prolonged restraint does not seem to be very irksome. In adults it would probably be better to adopt the newer method of tubulation.



FIG. 1.



FIG. 2.

Case I.

Case I.—I. L., female, aged 11. Pigmented hairy mole of left cheek, reaching bridge of nose and naso-labial fold. Deeply pigmented skin and long black hair. November, 1915: Entire mole excised, except a small area in right temporal region. Pedicle divided a week later. Whole graft took, and most of suture line healed by first intention. A marked ectropion at the outer canthus followed. July, 1919: Ectropion corrected by Thiersch graft. Only partially successful. To be further corrected later. Note that skin is normal in appearance, sensation, and in neurovascular supply (e.g., blushing).

Case II.—E. B., female, aged 4. Pigmented hairy mole, covering right cheek, extending from bridge of nose to temporal region, involving lower eyelid, but not involving forehead. November, 1919: Removed from cheek, a wide area of lower eyelid being left undisturbed. Graft from right arm applied. Pedicle divided one week later. Whole graft took perfectly, the suture line uniting by first intention. No ectropion has followed.

Case III.—G. M., male, aged 7. Hairy mole, pigmented, covering right cheek, and right side of forehead, surrounding eye and extending on to right side of nose. Extended below naso-labial fold on to upper lip, almost reaching mid-line. March, 1920: Mole removed from right cheek, replaced by whole

skin flap from right arm. Arm fixed over head for seven days. Inner quarter of flap (in angle between nose and eye) sloughed, and this area was covered by Thiersch graft from thigh. Remainder of graft took well, but severe ectropion followed. July, 1920: Scar resulting from Thiersch graft excised. Skin flap raised from cheek and slid upwards to cover bare area. Eyelid, freed from scar, returned to normal position.

Case IV.—N. B., female, aged 3. Pigmented hairy mole, with black hair and deeply pigmented skin, occupying whole of left side of face. Margin reaches centre of forehead, bridge of nose, and naso-labial fold. Both eyelids involved. February, 1920: Portion on cheek excised, eyelid being avoided. Replaced by whole-skin flap from left arm. Pedicle divided a week later. Owing to narrow pedicle used inner half of flap sloughed. This area was therefore immediately covered by the same method, the pedicle of this second flap being again divided at the end of a week. A whole-skin covering was thus obtained for the whole area. If the scars remain prominent it is proposed to excise them at a later date.

Case after Operation for Hairy Mole of the Face.

By H. D. GILLIES, F.R.C.S.

Miss L., aged 28.

Condition: Large hairy mole occupying area from left angle of mouth over the cheek and mandible and down on the submaxillary region on the left side. Greatest length, 4 in.; greatest breadth, 3 in. During the last six years has had considerable treatment with carbolic snow, electrolysis, and liquid air. Patient has had to shave every morning and has attempted to mask the deformity by means of grease paint. The total disfigurement, even when masked, was such as to render her life extremely unhappy.

November 24, 1920, operation: Removal of the mole by excision and its replacement by an original pedicle flap from the forehead. The base of the pedicle was on the left temporal artery. The forehead flap was cut exactly to shape of the excised mole, except that there was not enough available forehead to fill the raw area caused by the excision in the submaxillary region. This was closed by advancement of the neck skin.

December 5, 1920, operation: Pedicle returned to forehead, and raw area of forehead pressure-Thiersch-grafted.

December 16, 1920, condition when shown at the meeting: A slight recent scar is obvious round the grafted portion. There is no deformity of the angle of the mouth. Colour of the new skin is good, and

expression lines are already developing in it. The forehead scar is entirely masked by the dressing of the hair. Further cosmetic surgery is contemplated on the more noticeable portions of the scar.

It is very interesting to compare the splendid result achieved by Mr. Souttar using the arm pedicle flap for an extensive mole. My own case is a smaller one, and in an accessible position, except for the difficulty at the angle of the mouth. For that I use an original development of the method I have been employing in connexion with noses, employing the forehead skin for replacement, as that is much nearer the kind of skin on the cheek than any other.



FIG. 1.



FIG. 2.

DISCUSSION.

Dr. MACLEOD said that some twenty years ago in Vienna, Professor Lang used to do a somewhat similar operation for the treatment of lupus of the face. He excised the lupus, going well down to the subcutaneous tissue; he then mapped out a piece of skin from the thigh about $\frac{1}{4}$ in. larger than the lupus patch excised, to allow for shrinkage, and sutured it in position on the face. So far as the removal of the lupus was concerned he got fairly good results.

The PRESIDENT said that cases of the kind were the despair of the skin physician. He saw Mr. Gillies' case several years ago; Dr. Colcott Fox showed the patient to Dr. Wickham, of Paris, to see if anything could be done for her by radium. Dr. Wickham's answer was in the negative. Both Dr.

Fox and he (the President) treated her for some time by freezing, which proved, however, quite unavailing. Then they began to destroy the hair slowly by electrolysis, but this also was hopeless, and the patient drifted away, and, by good luck, came into the hands of Mr. Gillies. The result was, cosmetically, extraordinarily good, as it was also in Mr. Souttar's cases. He (the President) also saw Professor Lang's cases of lupus treated in the way mentioned by Dr. MacLeod, but he did not think the results obtained were so artistic as these. The scars in the Vienna cases were very irregular and thick, making the face look like a map of the United States. In many of the cases, however, the lupus was cured.

Three Cases of Dermatitis Scrofulosa.

By H. W. BARBER, M.B.

DURING the past six months I have been collecting cases of this condition, which is probably the same as that described by Dr. Adamson some time ago. I observed that most of the patients with these scaly patches present definite stigmata of tuberculosis, and thought it would be interesting to ascertain whether in such cases definite evidence of active, or potentially active, tubercular infection could be demonstrated. At my suggestion, therefore, Dr. Attwater has collected between fifty and sixty cases, and has investigated them fully with Dr. Marshall, who is in charge of the Tuberculosis Department at Guy's Hospital. I consider that the condition of the scalp known by the French as *fausse teigne amiantacée* of Alibert is the same. It differs from ordinary pityriasis of the scalp, or dandruff, in that the scaliness occurs in circumscribed patches usually on the vertex, and that the scales are thicker, and show a tendency to "climb up" the hairs, to which they are closely adherent.

I have recently seen a girl, aged 19, who was sent up by a doctor for pityriasis of the scalp. She had one patch of *fausse teigne* on the vertex. Dr. Marshall found definite evidence of tuberculosis in her lungs on X-ray examination, and her symptoms are very suspicious of early active tubercular disease.

DISCUSSION.

Dr. ATTWATER: During a period of eight months at Guy's Hospital I collected a series of 50 cases of the condition described by Dr. Barber under the name of "dermatitis scrofulosa"; 46 of these were children under 16 years of age. Of these 50 cases, 34 made their appearance at the Skin Department before attending the Tuberculosis Department; the remaining 16

had attended the Tuberculosis Department before being seen at the Skin Department. This is of interest and of some importance as showing that in the majority of cases the patient or the relatives regarded the skin lesion as being of greater seriousness than any symptom of general ill-health that may have been present. These cases were all examined from the special point of view of the existence of some *clinical* evidence of tuberculosis, and I now enumerate some of the more important results of my investigation:—

(1) *Stigmata of Tuberculosis*.—(a) Excessive growth of fine downy hair, especially on the back and on the arms and forearms, was present in 35 cases; (b) long, dark and silk-like eyelashes were present in 27 cases; (c) enlarged cervical glands were present in 18 cases (5 of which were associated with septic tonsils and carious teeth); (d) Lombardi's veins or spinal telangiectases were present in 12 cases; (e) there was clubbing of the fingers in 7 cases (associated with congenital heart disease in one case). I need not discuss the relative importance of any one or all of these.

(2) *Family History*.—There was definite evidence of "household" infection in 6 cases, the father or the mother or a brother or a sister having at the time active tuberculosis and living in the same house. In 2 cases there was a history of the death from phthisis of a member of the same family.

(3) *Previous History of Tuberculosis*.—10 cases gave a history of having previously suffered from tuberculosis; these were as follows: Spinal caries, 1 case; tuberculous disease of the left femur, 1 case; tuberculous foot, 1 case; tuberculous rib, 1 case; tuberculous peritonitis, 1 case; tuberculous pleurisy, 4 cases; apical phthisis, 1 case. Four of these cases had already been in-patients of sanatoria.

(4) *Symptoms*.—The following symptoms were present: Cough in 37 cases; cough with expectoration in 11 cases; excessive sweating in 32 cases; wasting in 29 cases; pain in the chest in 12 cases; pain in the abdomen in 5 cases; loss of appetite in 15 cases; fatigue and dyspnoea in 14 cases.

(5) *Percussion of the chest* revealed root dullness in 29 cases; apical dullness in 14 cases; parasternal dullness in 4 cases, 2 of which also presented paravertebral dullness; definite narrowing of Krönig's areas of apical resonance was obtained in 6 cases, three of whom were girls of 18 years of age.

(6) *Auscultation of the chest* revealed definite crepitations in 12 cases, in 7 of which they were confined to the apices and upper lobes.

(7) *Eustace Smith's Sign* (consisting of a bruit over the manubrium sterni with the head in the fully extended position), was positive in 12 cases.

(8) *Pleuritic rubs* were heard in 3 cases; all were confined to the upper lobes.

(9) *Examination with the X-rays* revealed: (a) Increased opacity of the roots of the lungs in 23 cases; (b) scattered opaque nodules in 18 cases, confined to the upper lobes in 6 cases; (c) increased fibrosis in 19 cases; (d) mottling of the lung substance in 11 cases, confined to the upper lobes in 8 cases; (e) increased bulk of the bronchial glands in 21 cases.

(10) *Sputum* examined in 6 cases, but no tubercle bacilli found.

(11) *Temperatures* were recorded at every attendance at the Out-patient Department, and in many cases charts, showing the morning and evening temperatures, were obtained, and by these means 15 cases showed an evening temperature above 99° F. on repeated observation.

(12) *Body-weight*.—Careful and repeated weighing was carried out in all cases; 12 cases showed a satisfactory gain in weight; 13 cases remained more or less stationary; 15 cases showed a definite loss of weight.

(13) *Grouping of Cases*.—I finally grouped my cases as follows: *Group I*.—Cases which showed evidence of active tuberculosis. *Group II*.—Cases which presented evidence of old tuberculous infection, but in which there was no evidence of active disease at the present time. *Group III*.—Cases which presented evidence of recent infection, but in which there was some uncertainty as to whether the disease was still active. *Group IV*.—Cases which displayed evidence of enlargement of the bronchial glands. These may be looked upon with suspicion. *Group V*.—Cases in which there was no evidence of tuberculous infection.

(14) *Diagnoses*.—*Group I* contained 18 cases. They were: apical phthisis, 3 cases; acute tuberculous pleurisy, 3 cases; root phthisis, 1 case; tuberculous bronchial glands, 10 cases; tuberculous cervical glands, 1 case. All cases in this group were notified to the Medical Officer of Health. *Group II* contained 12 cases. They were: old root phthisis, 3 cases; old tuberculous glands, 6 cases; old tuberculous spine, 1 case; old tuberculous foot, 1 case; old tuberculous rib, 1 case. *Group III* contained 11 cases. They were: apical phthisis, 3 cases; root phthisis, 1 case; tuberculous bronchial glands, 6 cases; tuberculous mesenteric glands, 1 case. *Group IV*: Enlarged bronchial glands, 6 cases. *Group V*: No evidence of tuberculosis, 3 cases.

(15) *Result of Investigation*.—Forty-one cases (Groups I, II and III), or 82 per cent. of the series, showed definite evidence of tuberculous infection, the infection being still active in 18 cases (Group I), or in 36 per cent. of the series.

The PRESIDENT said that from a clinical examination he could not differentiate these cases from those of scurfy patches, which were present in a large proportion of poor children. He worked at the subject twenty years ago, and, for his own purposes, gave the cases the name "discoïd eczema," though it was not a true eczema. He read a paper on it at the Paris Congress in 1900, pointing out its varied bacteriology, and concluding it was due to wetting of the pillow. At that meeting Professor Boeck, of Christiania, laid stress on the fact that these patients were all tubercular, his reason for the statement being that when they occurred on the body they produced a folliculitis, with a little erection of the follicle, which, he said, was a form of lichen scrofulosorum. He (the President) did not agree with that point of view. On his return, Dr. Whitfield took four cases and injected them with old tuberculin—a thing he would not think of doing now with fuller knowledge—but there was no reaction in any of the four. Either, therefore, these cases differed from the "*dartre volante*" of the French, or, tubercle

being so common in London, the association was nothing more than a coincidence. He inclined to the latter view. These scurfy patches were very difficult to cure. On smothering them with ointment the patch seemed to disappear, but on washing off the ointment it was found not to have been cured. That was one reason why he did not think Sabouraud was right when he claimed the disease as a very mild form of impetigo, giving it the name "impetigo sicca." If that were the condition, he did not see why it should be so resistant to cure. The question of the relationship to tuberculosis had been brought up before, but in the limited number of cases in which he used the reactive method, the result was negative.

Dr. H. G. ADAMSON said that he formerly saw at a children's hospital a large number of children with scurfy patches and he tried to classify them and work out their cause. He concluded that many of them occurred subsequently to impetigo, associated with streptococcal infection; others were due to the careless use of strong common soaps, or to other irritants, such as sulphur, when used for the treatment of scabies. But among these various cases he occasionally came across some in which the scurfy patches were symmetrically distributed, and were very resistant to treatment. It took him five years to collect five cases, hence he regarded them as uncommon. They all had dry scaly patches on the arms and legs, and on the side of the face. He had shown such cases several times, and had called them chronic superficial dermatitis in symmetrical circumscribed patches. In a paper on the subject he discussed the question of diagnosis between chronic eczema, seborrhœic eczema, lichen scrofulosorum, Boeck's eczema scrofulosorum, parapsoriasis of Brocq, and the parakeratosis of Brocq, and he concluded that these were independent cases. In two of his cases the Calmette test was done, with negative result. In none of the cases he had seen had there been any evidence of tuberculosis. His final conclusion was that they were streptococcal conditions. In two or three of the cases the skin trouble began after a discharge from the ear. Dr. Barber had not given a definite clinical account of his cases. If one took fifty children with scaly patches these fifty cases might include chronic eczema, seborrhœic eczema, lichen scrofulosorum, parapsoriasis of Brocq, the symmetrical circumscribed patches he had just described, and various other affections, and it would not be surprising if evidence of tuberculosis were found in a certain proportion of these cases. What they wanted to know was whether any definite clinical type of chronic scaly patch was related to tuberculosis, other than the type known as lichen scrofulosorum.

Dr. G. MARSHALL considered the President's point, that both the conditions, this disease and tuberculosis, were common in poor children, was a most important one. He saw Dr. Barber's cases from the point of view of the chest infection, and for a long time he was entirely sceptical, because very few of the children were obviously ill. Tuberculosis was so common in the neighbourhood in which Guy's Hospital was situated, that

it was necessary to be able to say more than that the patients had diminished resonance at the lung roots, and opacities in the lung as shown by X-rays. They did not diagnose tubercle unless the general condition showed signs of toxæmia, in that the patients lost weight and had pyrexia. They had not tested these children with tuberculin, either by von Pirquet's method or by injection: the trust physicians had placed in tuberculin tests was pathetic. He had done many tests with controls, and with Koch's old tuberculin many gave no reaction at all, though the patient was known to have active tuberculosis and was coughing up the bacilli. There was no standardization of tuberculin, even that obtained from laboratories of repute was often negative. He advocated ignoring negative evidence obtained by doing a tuberculin test. The only additional evidence of tubercle which was taken was when a child, sitting in a chair, well clothed, had a definite pleuritic rub.

Dr. F. PARKES WEBER said he did not consider the presence of so-called spinal telangiectases in twelve out of fifty children as a point in favour of the suggested tuberculous origin of the cutaneous condition in question. These "spinal telangiectases" were very common in quite normal young adults.

Dr. MACCORMAC said that there was certainly a type clinically similar due to a streptococcal infection, for he remembered when, some years ago, he was a medical officer to the London County Council an epidemic of this infective condition occurred in one of the schools. He thought more than half of the children in certain class-rooms became infected, and that the causal organism was determined to be a streptococcus by bacteriological investigation. In this particular outbreak the eruption was found on the face, was contagious, and was limited to certain class-rooms. It proved rebellious to treatment.

Dr. SEMON thought that the morphological description of the lesions in these cases had hardly been succinct enough to differentiate them from the common types of scurfy patch to which the President had referred. The delicate follicular plaques on the arms of one of the cases might conceivably be due to a tuberculous focus, but he was inclined to group the facial lesions in the other cases as being due to an external irritant, such as a wet pillow, or soap of an irritating, super-alkaline type. He recalled a case in a girl aged 9, in which local applications of various kinds had failed to relieve permanently, until the tooth-paste she had been using was changed for a milder variety.

Dr. ARTHUR BOYS said Dr. Marshall's contempt for tuberculin tests without control suggested to him (the speaker) that the present contribution would be of greater value if the statistics of the evidence of tuberculosis in these children (fifty) were accompanied by figures with regard to fifty children of the same age and social standing who showed no eruption.

The PRESIDENT wished to join issue in regard to the statement which had been made in reference to tuberculin, if used by injection. He did not now use tuberculin by injection, because it had been learned that it was dangerous in

that way; but it was known to older members of the dermatological specialty that in the cutaneous lesions of tubercle, injection by tuberculin was an extraordinarily reliable method. In the early discussions as to whether Bazin's disease was or was not tuberculous, numbers of cases were tested with tuberculin—he had tested several himself—and in no instance had he failed to get a high temperature. Now, he would regard the doses formerly given as criminal. Patients got a temperature of 105° F., and the lesions liquefied or disappeared. His cases were done before 1900. Therefore he agreed that the use of old tuberculin by injection must be given up, not because it was unreliable, but because of its great danger to the infected patient.

Dr. MARSHALL agreed with Dr. Weber that but small importance could be attached to the presence of spinal telangiectases in these cases. It was one of the ordinary stigmata which were quoted, but it had no real place in the diagnosis of these cases.

Dr. BARBER (in reply) said he thought he could differentiate this condition from darte volante of the French, which he agreed was usually due to maceration of the skin with saliva or discharge from the nose, followed by secondary infection. It could be differentiated from the soap dermatitis, with which they were very familiar at Guy's Hospital. He hoped to publish a paper giving colour representations of these patches. He thought Dr. MacCormac's cases were examples of darte volante. He had recently been looking after three children, all of whom had superficial scaly patches on the face, and the nurse and mother developed the condition too. There was no evidence that the eruption now shown was infective, and he believed the clinical appearance was different from that of the other conditions mentioned.

Bilateral Parotitis of (?) Syphilitic Origin.

By H. C. SEMON, M.D.

THESE patients are a mother (aged 54) and her daughter (aged 21). The daughter's case is an example of Hutchinson's classical syndrome: (1) There was complete bilateral nerve deafness; (2) iritis, for which double iridectomy had been performed; and (3) the characteristic circular bevelling of the central upper incisor teeth. The mother has a strongly positive Wassermann reaction, and confessed to genital sores, and a skin eruption coinciding with a miscarriage which immediately preceded the birth of her daughter, here shown. She has five younger children, all healthy. The dryness of the mouth, for which all manner of treatment has been tried, followed gradually on an attack of "influenza" four years previously, and is so complete as to make swallowing of any solid substance impossible without a drink of

water. There is complete absence of the salivary ferment as tested against a control, with a 0.1 per cent. starch solution, but the functions of taste and smell are unimpaired, and the patient appears to have an otherwise normal digestion. Associated with the dryness, there have been frequently recurring attacks of parotitis, usually of the right gland. A well known surgeon excluded calculi about two years previously.

The case is absolutely unique in my experience, but two somewhat similar cases, one in a woman, aged 58, and another in a girl, have recently been described by Portmann in the *Journal des Medecins de Bordeaux* (August, 1920). This author appears to have had the same difficulty in arriving at the ætiological factor.

I do not desire to lay too much emphasis on the strong specific history in this case, but I am assured by the patient that since the commencement of anti-syphilitic medication six weeks previously, the mouth has begun to show signs of moisture, and there is no doubt that the lateral borders of the tongue are distinctly less dry than hitherto.

Case of Pigmentation (? Addison's Disease).

By J. M. H. MACLEOD, M.D.

THE patient is a boy, aged 6. His skin shows a symmetrical melanotic pigmentation around the mouth, on the neck, axillæ, nipples, umbilicus, penis and scrotum, inner surfaces of the thighs, gluteal fold, and popliteal spaces. The remainder of the skin has a dirty appearance and is slightly pigmented everywhere. The colour in the above mentioned regions varies from a light brown about the neck to almost black in the nipples and genitalia. On the scrotum and penis the skin is not only pigmented but is rough and thickened. The mucous membrane of the mouth is not affected. At birth the skin was normal and the pigmentation did not appear till he was several months old.

The child is delicate, thin and nervous. When he was about a year old he was under treatment for tuberculous peritonitis at the Victoria Hospital for Children. He made a fairly satisfactory recovery, but has since been delicate, rather weakly, and has suffered from occasional attacks of bronchitis. Lately he has been losing weight. His heart's action is not definitely feeble, there is no

irritability of the stomach or diarrhoea, and the spleen is not palpable. The pigmentation probably results from tuberculous involvement of the suprarenals and fibrocaseous changes.

Case of Early Sclerodermia.

By J. M. H. MACLEOD, M.D.

THE patient is a girl, aged 14, with discoloured patches on the skin—especially on the trunk. These patches are slightly pigmented with a faint brownish tinge, and present a violaceous border which fades into the surrounding skin. The skin of the affected areas is very little altered in texture, except in two of the patches in which it has begun to become sclerosed, white, and shiny. There is a large patch occupying half of the right side of the abdomen, extending from the back downwards and forwards to near the groin, and a number of smaller patches chiefly over the back and buttocks and especially confined to the right side. A number of the patches on the back are oval in shape, with the long axis stretching downwards and forwards roughly in the direction of the ribs. The lesions first appeared about two years ago, immediately following an attack of acute tuberculous pneumonia. From this attack the child partially recovered, but has been delicate ever since, and is now suffering from tuberculous lung disease involving the upper part of the right lung.

The special interest of the case consists:—

- (1) In the early stage of most of the patches (sclerosis not having set in), so early as to render the diagnosis difficult.
- (2) In the association of the cutaneous lesions with tuberculosis—an association which I have not seen referred to in the literature, and which in this case seems to be more than a coincidence. It has been known to occur in connexion with other general disturbances, such as rheumatism, myxœdema, pregnancy, alcoholism, &c.

It is an interesting point that the affection is much more extensive on the right side than on the left, and that it is on the right side that the lungs are chiefly, if not solely, affected. Cases of this type point rather to an infective process of toxic origin being the cause of the lesions and to the vascular changes being primary.

Section of Dermatology.

President—Dr. ARTHUR WHITFIELD.

Lichen Planus Obtusus Corneus.

By E. G. GRAHAM LITTLE, M.D.

THE patient, a man aged 57, had a remarkable condition of hands and tongue, of three months' duration. It had been remarkably itchy. Lichen obtusus I regard as a variety of hypertrophic lichen planus. The extreme circumscription of the lesions, and the very horny nature of the skin, justifies the term "corneus" as part of the title. The tongue is the most remarkable feature: it has a macerated white appearance from tip to base, and when first seen the lips were also in a similar condition. Dr. Pringle, showing a similar case some years ago, likened the condition to an asbestos covering. The man is otherwise in fair health, and there is not the usual history of nervous shock.

Dr. SIBLEY did not agree with the exhibitor in describing this case as one of lichen obtusus corneus. Cases which had previously been so described were discrete; this one was distinctly diffuse, the whole hands and forearms were affected. He had himself shown three cases to the Section in which the lesions were discrete, chronic and extremely irritable, and in all of those patients there was very little other evidence of lichen planus about the body: what lesions there were were very isolated and ill-defined; nor had lesions been found in the mucous membranes, so much so that some authorities considered the obtusus corneus as a distinct disease from lichen planus. He regarded the present case as one of lichen planus becoming hypertrophic, and the condition of the tongue was most interesting.

¹ At a meeting of the Section, held January 20, 1921.

Morphœa Guttata with Arthritis.

By E. G. GRAHAM LITTLE, M.D.

THIS patient, a woman, gives a long and somewhat obscure history of Raynaud's phenomena with arthritic conditions, and she has had ill health for eight years. Her lesions are of a dead-white hue, and are grouped in a special way over the sacrum. On the trunk there are numerous very small white patches, guttate white spots. I am not absolutely certain that it is morphœa. The patient attributes the pigmentation present in some parts of the body to treatment which she has had for nervous pains—i.e., strong acetic acid, which may have accentuated the skin condition. An alternative diagnosis is vitiligo.

DISCUSSION.

Dr. F. PARKES WEBER regarded the case as an example of a very rare form of vitiligo, that in which several of the white (leucodermatous) patches had in their centre a small mole. His attention was first drawn to the condition by seeing a patient shown by Sir Humphry Rolleston¹; that patient was, however, likewise suffering from jaundice. In 1916, R. L. Sutton drew attention to the subject in his paper on "An Unusual Variety of Vitiligo."² Dr. J. L. Bunch had shown characteristic examples of the condition in England. It appeared that in cases of vitiligo the leucodermatous areas had sometimes a tendency to develop with congenital moles as centres.

Dr. WOODLEY STOCKER said that this patient was first taken ill eight years ago with diarrhœa and sickness, which she attributed to fish-poisoning, but there were no urticarial manifestations. She had nervous prostration. She became worse, and Raynaud's phenomena supervened in her hands; these lesions she regarded as broken chilblains. When she first came under his care four years ago she was suffering from much nervous exhaustion and weakness. As no physical defect was found, it was attributed to neurasthenia, and she was treated with iron, cod liver oil and strychnine. As she did not improve under this treatment, Dr. Stocker gave her hormotone tablets for about a year, and there was definite improvement. After their cessation she continued to be in a fair state of health. Later she again developed gradually increasing weakness, with difficulty in walking. The blood-pressure was 90, and the knee-jerks somewhat brisk. As he had had a case of neurasthenia which did well after acetic acid was applied to the

¹ *Proc. Roy. Soc. Med.*, 1910, iii (Clin. Sect.), p. 195.

² *Journ. Cutan. Dis.*, 1916, xxxiv, p. 797.

spine, he tried this and got good results. She left off the acetic acid two years ago, and for eighteen months afterwards there was no staining such as was now evident. Last autumn she applied acetic acid again for a fortnight, but the previous April, i.e., before re-commencing the acetic acid, she saw brown staining. He had considered it might be either morphea or vitiligo. She had arthritis in the spring, in the shoulders, arms and knees.

Oriental Sore of Lobe of Ear.

By S. E. DORE, M.D.

THE patient, a young man, aged 20, developed a hard swelling in the lobe of the left ear when he was on board ship on his way from Aleppo to Paris. He is not conscious of having had any insect bite and there is no history of direct infection, but he states that the condition is extremely common in Aleppo amongst the school children and that the mothers purposely allow their children to mix with infected subjects in order to get it over. In Paris he consulted a well-known dermatologist, who made a bacteriological examination with a negative result. An ointment was prescribed which caused the lesion to suppurate. When first seen by the exhibitor on January 10 there was an inflammatory swelling of the lobe which was enlarged to twice its normal size and had a somewhat elastic feeling to the touch as if it contained fluid although none was present on puncture. The skin over the tumour was red and slightly nodular in parts but there was no ulceration. Films from the fluid obtained by puncturing the swelling with a needle showed large numbers of Leishman bodies. A Sabouraud pastille dose of X-rays through a 0.25 mm. aluminium filter had been given, following the suggestion of Dr. F. C. Ormerod who had reported 84 out of 130 cases in Mesopotamia cured by a Sabouraud unit of X-rays.¹ In view of Dr. Castellani's opinion that the disease becomes rapidly generalized, the question arises whether it is necessary to resort to injections of antimony or emetine at once. The patient has had some fever, but he attributes this to Aleppo fever which is considered to be the same as malaria.

¹ "On the Treatment of Oriental Sore by X-rays," F. C. Ormerod, *Lancet*, October 30, 1920, p. 893.

Anomalous Granuloma.

By J. L. BUNCH, M.D., D.Sc.

THE patient is a man aged 39, with a granuloma on the upper lip. He has been under my care many months for an affection of the hand, which has been badly burned by X-rays, applied with too much zeal for hyperkeratosis of the palm. The lip lesion is somewhat hard to the touch, but not very definitely indurated; it has never ulcerated, and at no time have there been enlarged glands, sore throat, or a rash. The Wassermann reaction, however, is strongly positive in all dilutions. The man denies having had any skin or other affection before. No biopsy has, so far, been performed. It cannot be a primary chancre, as there are no confirmatory symptoms, and the other possible diagnoses are tubercle or epithelioma. Dr. Adamson tells me he had a patient—a man of the same age—who presented all the appearances seen in this patient, and on excision of the growth it turned out to be an epithelioma. The man appeared to be otherwise healthy, no tubercle could be detected in him, and there was none in the family.

Extensive Nævus of the Type Nævus Unius Lateris.

By J. H. SEQUEIRA, M.D.

THE patient is a single girl, aged 23, who looks very young for her age, is rather backward and is so nervous that her mother accompanies her to and from business. Her mother is said to have been badly frightened—she was actually burned—when she was three to four months pregnant. The girl was a full-time child, she was in bed at the age of 18, for six months, with rheumatic fever and now has well compensated mitral regurgitation. The lesions which appear as close set blackish horny follicular thickenings of varying size, tender in places, are distributed over the right side of the face and neck, the left side of the face, neck, trunk, upper and lower limbs. In the thin skin of the affected regions are many large comedones. A slide shows a very thin epidermis with great follicular hyperkeratosis—long columnar cells forming the basal layer—and a notable absence of any inflammatory reaction in the corium. The tender areas appear to be due to inflammation caused by secondary septic infection, due to rubbing.

DISCUSSION.

Dr. J. J. PRINGLE mentioned an admirable photograph of an identical condition in the November number of the *British Journal of Dermatology* for 1896.¹ The case depicted was described by Dr. Selhorst, of The Hague, under the title of "Nævus acneiformis unilateralis."

The PRESIDENT said this was a very rare type of nævus and quite different from the ordinary mole, which might also be distributed more or less according to the segments. It was curious how moles differed in their histological characters. There seemed to be three types, one with the columns and masses of submerged cells, a second in which there were papillomatous overgrowths, no submerged cells and little or no hyperkeratosis, and a third to which this case belonged, in which there were no submerged cells but marked hyperkeratosis. He asked Dr. Sequeira if he had examined any of the comedo-like bodies present in this case for the presence of the microbacillus. He did not suggest this in relationship to a possible seborrhœa but because of the severe atrophy of the skin. In deep scarring of the skin they were of course all familiar with the large comedo which was occasionally present, and in these he knew from his own examinations that microbacilli were present. He believed that this was due merely to horny stagnation. Apparently in any nice pocket of stagnating horny cells which underwent fatty changes the microbacillus found a suitable habitat, and he thought that if they were present in this case it would be evidence that these comedo-like bodies were the result of stagnation rather than of hyperkeratosis. These cases were so rare that he had never had one under his care.

Dr. J. H. SEQUEIRA (in reply) said he had not yet had an opportunity of staining for the acne bacillus, but in another type of comedo, which occurred in children, after rubbing with camphorated oil, the acne bacillus was not found.

The PRESIDENT: In adults the acne bacillus is present in oil acne, but not in children.

Case for Diagnosis.

By S. E. DORE, M.D.

THE patient is a man, aged 69, who has been a cooper by trade. The first thing he noticed was itching of the skin of the chest and then of the left arm and peri-anal region. This was followed by thickening and roughening of the skin in the two last situations, nothing remaining on the chest except a small scar. Two years ago raised, lumpy patches appeared on his left arm with a similar condition

¹ *Brit. Journ. Derm.* 1896, viii, p. 419.

on the right side of the anus and about the same time an ulcer developed in a corresponding position on the left thigh. When he came under observation there was a large area of lichenification of the skin of the left arm extending from above the flexure of the elbow about half way down the forearm towards the extensor surface. The skin of this area was thickened and pigmented with marked exaggeration of the natural lines of the skin. There was also marked prominence of the



follicles in the parts not lichenified. At the upper part of the arm there was a raised oval tumour about $1\frac{1}{2}$ in. in length with a rugose surface and a shallow ulcer in the centre. Below this, on the outer aspect of the arm above the elbow, there were two similar irregularly shaped larger hypertrophic masses, neither of these being ulcerated. At the upper extremity of the gluteal cleft there was another small area of lichenification and some similar patches on the left leg. On the thighs, at the extreme upper and inner aspects below

the anus, there were, on the left side a large punched out ulcer, 2 in. by $1\frac{1}{2}$ in., and on the right side, opposite to this a raised hypertrophic mass covered by white macerated skin having a warty appearance. This papillomatous condition—which had now to a large extent cleared up as the result of antiseptic measures—with the thickening of the palms and fissuring of the tongue which were also present, suggested at first sight a possible diagnosis of *acanthosis nigricans*. But the absence of pigmentation, except of that associated with the lichenification of the arm (also more pronounced at first) and of warty vegetations in the other flexures negatived this hypothesis. The only alternative that suggested itself was that the lichenified area on the arm was due to lichen planus, with the development of enormous hypertrophy to account for the tumours which, in the case of the ulcer, might have been modified by traumatism and sepsis. There were no definite lichen planus papules discernible and this was only put forward as a tentative diagnosis.

The PRESIDENT agreed with Dr. Dore's suggestion that the case might be one of very unusual lichen planus. He hardly saw how this could be decided positively unless the patient would be obliging enough to develop a typical attack of that disease. He thought however it might be of use to examine histologically a piece of skin, not from the papillomatous overgrowths but from the hyperkeratotic area below the elbow-joint. He had seen cases of lichen planus with papillomatous lesions exactly resembling those in this case and he thought the ulcer in the anal region might be accounted for by scratching and pyogenic infection. They were all familiar with the fact that in Darier's disease, another eruption due to epidermic overgrowth, ulceration only occurred in these hot, moist situations.

Multiple Tumours of the Scalp.

By HENRY MACCORMAC, C.B.E., M.D.

THE patient, a man, aged 69, first noticed what he describes as lumps on the forehead about twenty-five years ago; he states they have been gradually increasing in size during the last thirteen years. Owing to his occupation as a platelayer on a railway he is subject to frequent injuries to the head, and to these he attributes his condition.

The lesions occupy the region of the hairy scalp and forehead and are very numerous, some thirty or more tumours being present. They vary in size, being on an average of the dimensions of a large pea.

Some are solid, while others are obviously cystic. They give rise to no unusual subjective sensations. The patient had also what was considered to be a rodent ulcer below the right eye; this has been recently removed by surgical means.

The lesions on the scalp resemble the so-called endotheliomata. The view that these growths are related to rodent ulcer is not completely confirmed in this case: the microscopical appearances and clinical course correspond more closely to the epithelioma adenoides cysticum of Brooke, an example of which this case would appear to be. The lesion below the eye on the other hand, could not have been differentiated from rodent ulcer either by its appearance or from the microscopical section.

Sections from a tumour on the scalp show masses of epithelial cells of the small type met with in rodent ulcer, with cysts, some of which contain a colloid-like substance, others appearing empty. In some parts of the growth there are well-formed blood-vessels, and the cellular growth has some appearance of taking origin in the vessel walls. This origin from the walls of vessels is not very clear, and stress is not laid upon it.

DISCUSSION.

Dr. H. G. ADAMSON said that some years ago he published in the *Lancet*¹ a paper on the relationship between Brooke's epithelioma adenoides cysticum and multiple rodent ulcer, and pointed out that they had the same histological structure—namely, that of a basal-cell epithelioma. He had also demonstrated that the scalp tumours often occurred in association with Brooke's disease and were also basal-cell epitheliomata. He believed that Brooke's epithelioma adenoides cysticum and rodent ulcer were both embryonic pilo-sebaceous glands, in which the cell-growth had failed to differentiate and had remained of the basal-cell type. Rodent ulcer occurred later in life, when the cell-growth was less stable, so that (unlike the benign form of Brooke) it broke down and formed an ulcer.

The PRESIDENT thought the present case lent much support to Dr. Adamson's views. With some slight hiatus it was possible to trace the steps between the submerged mole, the benign epithelioma and rodent ulcer. At the discus-

¹ *References.*—"On Multiple Rodent Ulcer, its Relationship with Multiple Benign Cystic Epithelioma," *Lancet*, 1908, ii, p. 1133; "On the Nature of Rodent Ulcer," *Lancet*, 1914, i, p. 810; "Epithelioma Adenoides Cysticum of Brooke in Mother and Daughter and two Sons: its Relationship to Multiple Rodent Ulcer," *Proc. Roy. Soc. Med.*, 1914, vii (Sect. Derm.), p. 95; "A Case of Multiple Benign Basal-cell Epithelioma of the Scalp," *Brit. Journ. Derm. and Syph.*, 1918, xxx, p. 130.

sion some time ago on tumours of the skin he had shown a series of slides illustrating this. He agreed with Dr. Adamson that they were all congenital in origin though they might not become apparent until later in life.

Lymphangioma of the Tongue.

By ARTHUR WHITFIELD, M.D. (President).

THE patient is a little girl, aged 10. The condition of the tongue is known to have been present for twelve months, but I cannot get any definite history as to how much longer than this. The tongue is slightly enlarged, and with fissures or lobes, but without soreness, and the surface shows four peculiarities: (1) Much enlarged papillæ; (2) papillomatous overgrowth with whitish horny tags, not detachable on friction; (3) when dried, minute almost crystal-like sparkling bodies, which on close examination proved to be minute cysts; (4) enlarged capillary tufts.

I have never seen such a tongue before, and on taking her round to the throat department I found that neither Sir StClair Thomson nor Mr. Hope had seen one either. I have seen a picture of lymphangioma of the tongue, but it is a much coarser lesion than this. Nevertheless that is the diagnosis I offer.

DISCUSSION.

Dr. F. PARKES WEBER considered that this was a typical example of lymphangioma of the tongue, and he was astonished to hear it was so rare. He asked whether any recent physical methods of treatment were of any use in this condition, for instance, if the tongue greatly increased in size.

The PRESIDENT (in reply) said he was sure that Dr. Parkes Weber was plainly wrong in thinking that the case was not very rare. He had shown it to men of great experience, and they had seen nothing like it. At the present meeting there were also men of vast experience present, and none of these except Dr. Weber were familiar with the appearance.

Frambœsiform Syphilis.

By W. J. O'DONOVAN, M.D.

THE patient is a single labouring man, age 28. He has never been abroad, save a period of service in France. Ten months ago he had gonorrhœa; he denies having noticed a primary sore or any sore throat.

For two months he has had an eruption on the scalp, which now appears as several discrete round lesions, 1 to 3 centimetres in diameter. These lesions are sharply defined, raised and red, with a very rough raised papillary surface. When first seen the surfaces were yellow with pus; hairs removed and heated in liq. potassæ showed no spores. There is bilateral enlargement of the posterior cervical glands, and one smooth shining macule 0.5 cm. in diameter in the right ante-cubital fossa. There are no throat lesions, no headache, no condylomata, no scar on the penis, and no enlargement of the inguinal glands. The Wassermann reaction is positive. While he undergoes the usual course of intravenous treatment by novarsenobillon it is proposed to treat the lesions with local applications of malachite green.

DISCUSSION.

Dr. J. J. PRINGLE said it was amazing to him how little was known in the profession generally about the "frambæsioid" syphilide, of which the case shown was a typical example. The lesion was by no means a very rare one, and its appearance was absolutely characteristic—*sui generis*, but the number of mistakes he had seen in connexion with it was large. The condition was generally mistaken for impetigo, and in three cases occurring in soldiers poulticing had been assiduously carried out for three months before they came under his care, while another, in private practice, had been treated with injections of collosol manganese for more than two months. It was unusual to find the condition confined to the scalp, as in the case shown, the lesions on other parts of the body being frequently of the "conglomerate suppurative follicular type" before they became characteristically frambæsioid. A point of interest was that the condition was almost always a comparatively early secondary manifestation, and another feature was the surprisingly small amount of scarring left after recovery, which was usually extremely rapid under treatment. In several cases he had seen in which the scalp was involved to the same extent as in the case shown, no appreciable baldness was left, although the lesions when first seen had the clinical appearances of being deeply destructive.

Mr. McDONAGH said that during the last fortnight he had seen four such cases in which a mistaken diagnosis had been made by even good dermatologists. The lesion was an early one, and hardly ever appeared later than the eighth month after the infection. In his last case the frambæsioid syphilide appeared before the primary sore was healed. The lesion was really a papule, in which an enormous hypertrophy of epithelium had taken place, this accounting for the absence of scar left on healing. As a rule the lesions disappeared very rapidly under treatment, although occasionally they proved most obstinate. In the latter cases intramine would as a rule be

efficacious. In two cases recently seen, the lesions appeared, for the first time, immediately after a full course of injections of arsenobenzene (full doses). Should intramine not effect their disappearance, it was best to give intravenous injections of different brands of arsenobenzene every other day in doses not exceeding 0.1 gm. In his experience this had proved the best treatment in all cases of malignant syphilis and cases approaching thereto.

Dr. PERNET said that he had written a short paper on the subject some three years ago.¹ This was based on three cases observed at the West London Hospital. The patients were white European women, who had never been out of the country. The frambæsiiform lesions were few and far between on the glabrous skin, but in all three cases the scalp was mainly affected.

The PRESIDENT said that he did not think these cases were very common but they were much commoner in patients who had come from the tropics, and had possibly caught the disease there. In the last 1,200 cases in the syphilis clinic at King's College Hospital they had had only one mild case.

Dr. MACCORMAC said that when he was in charge of the skin clinic at the Seamen's Hospital, Greenwich, he saw a number of these cases, and he was interested in Mr. McDonagh's remarks about the resistance to certain forms of treatment. His impression was that failure generally resulted from giving too small doses of salvarsan: the spirochaetes became habituated to it, and so it was not lethal to them.

Case of Severe Tertiary Syphilis.

By H. W. BARBER, M.B.

THE patient is aged 33, and is unmarried. Syphilitic infection is absolutely denied, but a penile scar is present. He states that the skin lesions began about two and a half years ago, the first one being a kind of "boil" on the face, which broke down forming an ulcer. Other lesions appeared later on the neck, chest, back and limbs.

He was sent to me as an extensive case of tuberculosis of the skin. He was then unable to walk. There were large fungating lesions on the face, numerous broken-down gummata in the back and limbs, and an enormous infiltrated mass on the chest. The lesions discharged pus freely, and were very foul. There was considerable pyrexia, and the patient was seriously ill. He was given 0.45 gm. of novarsenobillon immediately, and put on a mercury-iodide mixture. The temperature

¹ Pernet, "The Early Frambæsiiform Syphilide," *Med. Press and Circ.*, 1917, ii, p. 292.

rapidly fell to normal, and there was immediate improvement in his general condition. He has since had five more injections of novarsenobillon; many of the lesions have completely healed, and he can now get about fairly comfortably.

His appearance suggests that he is a tubercular subject, though no investigations for active tuberculosis have yet been made.

I should like opinions on the observation made by the late Sir Jonathan Hutchinson that syphilis in tubercular subjects is usually much more severe than in non-tubercular people.

DISCUSSION.

Dr. S. E. DORE said he remembered several cases in Dr. Pringle's clinic many years ago, in which patients who had tuberculosis and syphilis did badly. Since salvarsan had been introduced he thought the prognosis in these cases had been much better. In one case of a nurse with a digital chancre and advanced pulmonary tuberculosis the syphilis did well under salvarsan, which she took in the ordinary doses without ill effect, the fever abated, the patient gained flesh, and the physical signs also showed improvement.

The PRESIDENT said that the older members who had also been members of the late Dermatological Society of London would no doubt remember that several cases had been shown of patients with old established lupus who had acquired syphilis, and that these diseases in these instances did not modify one another noticeably. Tuberculosis was a disease which brought about a cachexia, and if the patient were cachectic his syphilis ran a severe course. He thought there was nothing specific about the effect of tuberculosis on syphilis, but that it was simply the result of debility such as was seen in underfeeding and excessive alcohol consumption.

Dr. GRAHAM LITTLE referred to a case of combined syphilis and tubercle which he showed seven years ago in a child, who had extensive lupus of the arm. It had gummatous lesions coming out frequently, some of which did not heal. He was sure many of the cases of ulceration were tuberculous ulcerations on a syphilitic basis; the transformation could be watched.

Dr. PERNET said that cases of syphilis complicated by pulmonary tuberculosis did badly in the old days when mercury was much pushed. It seemed to give the syphilis a chance of being more destructive. Mercury had to be used with great care in such cases,¹ just as arsenobenzol must be used with great care in cases in which there was hæmoptysis.

¹ Pernet, "The Intramuscular Treatment of Syphilis," *Lancet*, 1909, ii, p. 212.

Case of Xanthoma Multiplex.

By H. W. BARBER, M.B.

THE patient is a boy aged 4. He was healthy at birth. There are three other healthy children. The xanthoma lesions appeared nine months ago, and were first noticed on the hands. At present there are numerous typical xanthoma patches, chiefly situated on the backs of the hands, over the joints, at the back of the elbow-joints, in the joint flexures at the back of the knees, on the buttocks and around the ankles.

The patient is now under Dr. Cameron's care at Guy's Hospital. The urine contains no sugar or albumin, but Dr. Ryffel has found a very considerable excess of cholesterol in the blood-plasma. The blood-sugar has not yet been estimated. There is no evidence of disease of the liver, and the child appears perfectly well.

Dr. F. PARKES WEBER said the case reminded him of certain rare cases in adults associated with liver disease and obstructive jaundice of long duration. In regard to some adult cases it had been suggested that xanthomatous nodules might have been present in the biliary passages, and by their presence there have given rise to chronic obstructive jaundice with enlargement of the liver.

Case of almost complete Alopecia Areata of the Scalp of Five Years' Duration, in which rapid Regrowth of the Hair followed Removal of Tonsils and Adenoids, and subsequent Vaccine Treatment.

By H. W. BARBER, M.B.

E. G., BOY, aged 12. Bald patches began to appear on the scalp at the age of 7; within a few months practically the whole scalp was bald except for a fringe around the lower margin. At times growth of lanugo hair would appear and then this would fall again. He came under my care early in 1920. At that time there was almost complete alopecia except for a fringe of downy hair around the lower margin. There was chronic rhinitis, the tonsils were enormously hypertrophied, almost meeting in the middle line, and the posterior nares were blocked by a mass of adenoids, from which there was a constant muco-purulent discharge.

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The boy was admitted to hospital, and the tonsils were enucleated and the adenoids removed by Mr. Zamora on February 24, 1920. Cultures from the enucleated tonsils gave principally a growth of *Streptococcus pyogenes longus*, from which vaccine was prepared and administered for about five months. By April 13 the hair was growing freely, and he now has complete regrowth of normal hair except on a patch on the occipital region, where lanugo hair can be seen appearing.

I should be glad to know of members' experiences on the influence of removing septic tonsils or adenoids in cases of alopecia in children.

Dr. DORE said that with regard to the association of alopecia with tonsillitis, he had made inquiries since Dr. Barber called attention to the matter, and he had seen three cases in which the tonsils had been removed and the alopecia had come on after removal.

Section of Dermatology.

President—Dr. ARTHUR WHITFIELD.

Some Remarks on the Development of the Leishman-Donovan Bodies.¹

By J. E. R. McDONAGH, F.R.C.S.

IN 1915 [1] I showed the microscopic specimens of a case before this Section, labelled "Coccidiosis avenerea," which were illustrated later in my "Biology and Treatment of Venereal Diseases" [2]. The clinical history of the case was shortly as follows: A man aged 22, living in the North-West Frontier Province (India), fell while playing hockey and injured his knees and right elbow. The knee wounds rapidly healed but at the periphery of the elbow wound a rash developed, followed by a "go of fever" which lasted for three weeks. When I saw the patient some months later the elbow wound had healed in the centre but around were discrete granulomatous papules not unlike syphilitic papules surrounding a healed primary sore. There were also similar papules affecting the glans penis, the corona and the under surface of the prepuce. There was no evidence of syphilis and the complement fixation test was negative. Histologically the papules were found to be of lymphatic origin. Each papule was sharply circumscribed and divisible into three areas—an outer layer of plasma cells, then a layer of mixed plasma cells, lymphocytes and endothelial cells, while the centre was occupied in the main by endothelial cells. In the intermediary zone were to be found intra- and extracellular parasitic bodies, which I took to be the asexual development of a coccidial protozoon. I forgot all about this case till Dr. L. D. Shaw gave me a case of "Aleppo button" from which he had obtained in film the Leishman-Donovan bodies. This patient had a central raised lesion on the arm, not unlike a papulo-erosive chancre in which there had been no loss of surface. Around and radially situated were discrete papules which had undoubtedly arisen by direct extension, presumably by the lymphatics, from the central and primary lesion. Dr. Shaw excised the whole and I cut several sections of both the central and the peripheral lesions. The histological picture of the central lesion was not unlike the type of syphilitic primary sore just mentioned, except that it was much more sharply circumscribed; in fact, there was practically no cellular infiltration around the spurious fibrous capsule which encased the lesion. The lesion was well divided into the three areas above described and in the middle zone I found parasitic bodies which at once reminded me of the case I had described in 1915. In the central endothelial zone there were a few areas of necrosis in which several Leishman-Donovan bodies were to be discerned. The peripheral lesions had the same structure in strand form. The central endothelial zone was very well marked and appeared to be of lymphatic origin. The parasitic bodies were to be found in this zone and only on the surface where the epithelium had been destroyed were areas of necrosis to be found. The characteristic features of the lesions were

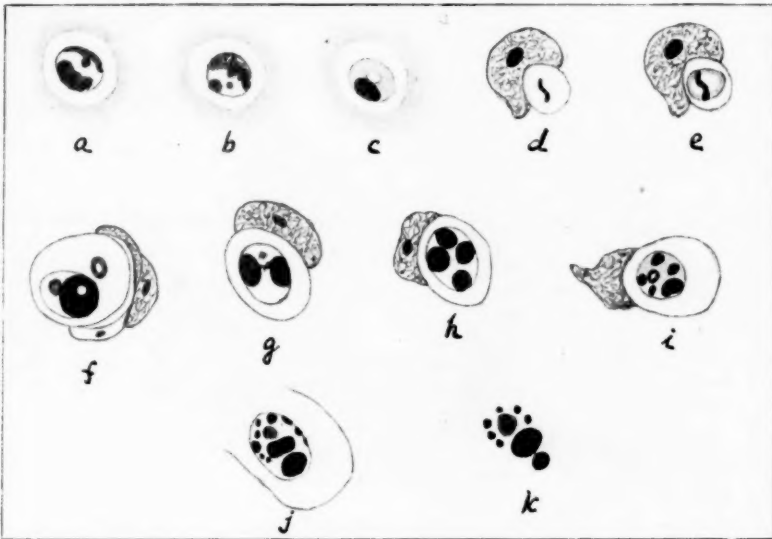
¹ At a meeting of the Section, held February 17, 1921.

undoubtedly the tri-zoned arrangement and the minimal amount of inflammation which occurred around.

About the same time, I had under my observation a man, aged 52, from Mysore, who for over twenty years had never been free from cutaneous lesions, which appeared suddenly, as small papules, to become furuncles, then ulcers, and finally they healed up when the crust had fallen off, leaving a deepish scar. The patient had had altogether over 200 lesions but they had never prevented him from doing his work. Being a medical man he had been seen by everybody, but the diagnosis of Leishmaniosis had always been considered untenable. I persuaded the patient to let me excise a lesion when it was two days old and I cut serial sections of the same with the following result. In the centre the epithelium had been thinned down and underlying it was an area of necrosis in which Leishman-Donovan bodies were to be found. On either side the epithelium was hypertrophied but below it and separated from it by a diffuse small round-celled infiltration was a dense zone of discrete and well-staining endothelial cells, which also formed the base of the necrotic area. Descending into the subcutis this endothelial zone was found to taper off into a blood-vessel the wall of which was composed in the main of small round cells. The intra- and extracellular parasitic bodies were to be found mostly in the mantle of this blood-vessel and sparsely in the zone between the epithelium and the endothelial cells on either side of the necrotic area.

Another type of case I also had under observation affected a man, aged 35, who contracted a sore on his left cheek in Baghdad. When I saw him some five months after he had been infected he presented an irregularly heaped up ulcer not unlike a frambesiform syphilide. The lesion was well infiltrated at its base and around and in the periphery distinct papules were to be seen. I removed a small portion of skin just outside the border of the main lesion and it presented the same histological features as the other three cases, except that the endothelial-celled infiltration was more diffuse and here and there arranged in the form of giant cells. Around the giant cells many intra- and extracellular parasitic bodies were to be found. All the sections were hardened in absolute alcohol embedded in wax and stained with pyronin and methyl-green. By this method the Leishman-Donovan bodies appear as round or oval cells which contain a big nucleus at one pole, a small nucleus at the other pole and a nucleolus or blepharoplast in the centre. The cell is usually found to be surrounded by a clear space or halo which I take to be of the same nature as the so-called capsule of capsulated bacilli. This halo is very characteristic of protozoal bodies studied in section and is, I think, produced by the antagonistic chemico-physical properties exhibited by the parasite on the one hand and the cells of the host on the other hand. If stained in such a way as to allow the parasitic nuclein to exhibit its affinity for methyl-green only the blepharoplast stains with pyronin. The blepharoplast which I take to be the nucleolus may be situated anywhere within the cell and sometimes it covers the bigger nucleus. In its centre a highly refractile non-staining dot is usually to be seen which is also always visible in the nucleus when the nucleus and nucleolus appear to be one. The small nucleus I cannot help thinking is an abortive male body, because the Leishman-Donovan body itself so closely resembles the female gametocyte of the *Leucocytozoon syphilidis*. The female gametocyte of the syphilitic coccidial protozoon not infrequently is to be found with what I originally considered to be two blepharoplasts. One of these so-called blepharoplasts

is discharged from the cell before the cell becomes a gamete, while the other functionates as a nucleolus and becomes discharged as one of the polar bodies after fertilization. I am tempted to hazard the opinion that the expelled blepharoplast is replaced by the male gamete or *Spirochæta pallida*, that the small nucleus of the Leishman-Donovan body corresponds thereto and that it is not expelled, in order to take the place of the male element. The Leishman-Donovan body is next seen in an endothelial cell. Some endothelial cells appear to contain more than one, but as far as I can determine only one fully develops in the cell while the others die and become disintegrated. The pictures in most text-books [3] of so-called mononuclear cells containing several Leishman-Donovan bodies in their protoplasm, I have never been able to verify in section. The host cell is, I believe, always the endothelial cell and



a, b, Leishman-Donovan bodies showing female and male nuclei and blepharoplasts; c, ditto, with male and female nuclei united and blepharoplast as clear spot; d, body with endothelial cells; e, ditto, showing developed blepharoplast hiding nucleus; f, one body developing in an endothelial cell; g, first stage in subdivision of body; h, second stage; i, third stage; j, k, spore cysts.

once a parasitic body has found its way therein that characteristic ballooning of the protoplasm of the endothelial cell, with its unstained protoplasm and clear space between its outline and the border of the parasitic body are never to be missed. The text-book pictures I believe depict the bodies lying on, but not in, the host's cells. The Leishman-Donovan body inside an endothelial cell may not differ from one viewed outside but more generally the small nucleus will be found to have become part of the large nucleus, while occasionally the parasitic body will appear to be no more than a streak of nuclein. This last-named body is very deceptive but working with a very high power ($\frac{1}{18}$ oil immersion) and with Nicol's prisms I have been able to

determine that, except for this streak of nuclein, the rest of the nucleus has been obscured by the bright, highly refractile dot which has increased so much in size as practically to cover the whole nucleus. An increase of nucleolar substance always denotes activity within the cell. Proceeding, the whole cell and the nucleus especially increase in size and the latter divides. Each part of this subdivision divides and subdivides till the cell resembles a spore-cyst. From the stage of the first division of the nucleus to the stage of the complete subdivision, the red pyroninophil body or nucleolus, with the highly refractile spot in its centre, is to be found in the cell. Sometimes one of the nuclear masses contains a highly refractile unstained dot in its centre. Presumably the function of the nucleolus is to regulate the development of the nucleus. By the time the complete subdivision of the nuclear material has been reached the endothelial cell is no more than an empty case of degenerated material which gives the appearance as if the parasitic cell was extracellularly situated. The final stage of the nuclear subdivision never goes so far as is reached by the zygote of the *Leucocytozoon syphilidis* in its spore stage, which rather inclines me to take the view that each of the nuclear masses develops extracellularly into a Leishman-Donovan body.

In the several clinical types, although there appears to be no difference in the development of the organism, there is a distinct variation in the size of the intracellularly deposited bodies. Whether this accounts for the clinical differences, and whether we are dealing with a similar development of different types of protozoa or not, are problems which will have to be solved in the future.

I have never seen what might be described as a division of a Leishman-Donovan body. The filament or thread which is seen in cultured bodies arising from the smaller nucleus tends, I think, to support my view that this mass of nuclein is of male heritage. Although cultures are instructive, we should not assume that the development of the bodies *in vitro* runs parallel with that *in vivo*. From syphilis, so far, only the spirochætal stage can be cultured, and it has been cultural experiments which have prevented many from regarding it as possible that the *Spirochæta pallida* is only the adult male of a coccidial protozoon. The histological pictures are interesting in so far as the structural alterations met with are also encountered in syphilis, tuberculosis, and other granulomata. Clinically, the disease is very like syphilis, as in most cases there appears to be a primary lesion which is followed, months and years afterwards, by other lesions. Furthermore, the recurrent lesions are more ulcerative than the primary lesion, which is likewise the case in syphilis—gummata for instance.

Finally, from the investigations undertaken, I cannot help suggesting that the development described is that of the asexual cycle of a coccidial protozoon. If correct, then the Leishman-Donovan body is the adult or mature form of an asexually reproduced protozoon, in which case the *Leucocytozoon Leishmania* would be a suitable name for it. This would give us syphilis as *Coccidiosis venerea* and Leishmaniosis as *Coccidiosis avenerea*.

REFERENCES.

- [1] *Brit. Journ. Derm.*, 1915, xxvii, p. 91. [2] McDONAGH, J. E. R., "Biology and Treatment of Venereal Diseases," 1915. [3] KOLLE und WASSERMANN, "Handbuch der pathogenen Mikroorganismen," zweite Aufl., 1913, vii, pp. 419, 466.

DISCUSSION.

The PRESIDENT said that in the case of a slowly-growing infiltration of this kind it was not safe to say that because it had not been noticed more than forty-eight hours it had only been growing for that time. He thought it was clear, from the specimen, that this was a considerable number of weeks old. He had cut many sections of slowly-growing conditions, such as experimental tubercle, and there was not anything like the formation of inflammatory tissue in the first forty-eight hours which Mr. McDonagh had now shown. What were these sections stained with? The stain seemed to him to be of the pyronin-methyl-green type, which complicated matters enormously to the ordinary histologist in determining what had happened in attempts to stain Leishman-Donovan bodies with such dyes, as they stained peculiar bodies in the host tissues and their degenerations.

Mr. McDONAGH agreed with the President that the painting depicted a lesion more than forty-eight hours old, and he said that he should have stated that the section was made from a lesion which the patient had only noticed for two days. Much went on *in situ* before the lesion was visible to the naked eye, as was the case in a chancre for instance. The speaker had more experience with pyronin and methyl-green than with any other stains, and it was possible by various methods to control the staining of both dyes accurately, and the pictures given were as true as it was possible to render them.

Case of Boeck's Sarcoid.

By J. L. BUNCH, M.D., D.Sc.

THIS woman, aged 40, has a number of small, pinkish growths on the chest, arms and body. The lesion in the centre of the chest started last September, and has been gradually growing ever since. It is now about the size of a pea. Later she developed a number of entirely new ones, some of them quite small. I have shown a section under the microscope: it presents a typical granulomatous appearance. I show them as sarcoids of Boeck, for want of a better name. I thought they might be of tuberculous origin. She tells me her husband had his leg amputated for sarcoma, and she has a boy, now aged 19, who, when young, had definite lupus vulgaris, which was excised at the Evelina Hospital. The woman herself is healthy, and she says that neither her father, nor her mother, nor any near relation have had tubercle. The microscopical specimen is from a lesion in the neck. It seems doubtful whether such granulomata disappear without treatment, and treatment must consist of destruction of each separate nodule.

Case for Diagnosis.

By E. G. GRAHAM LITTLE, M.D.

THE patient has a lesion on the skin below and spreading from the left eyelid. He is aged 40, and was under the care of Sir Arnold Lawson in October and November, 1920, who did some cutting operation, probably for Meibomian cyst. When I first saw the patient, on September 8, he had nothing more than a pustular folliculitis along the ridge of the eyelid; there was no redness or appreciable change in the skin of the eyelid below the hairy border. I saw him only once; then he went to the South of France at the end of December, and again came to me in the middle of January. Then, for the

first time, he had this curious affection of the skin of the lower eyelid, with a thin red edge bounding the lower margin. This edge has perceptibly advanced while he has been under observation; formerly it was $\frac{1}{4}$ in. below, now it is $\frac{1}{2}$ in. below the eyelid, the whole lesion being $\frac{3}{4}$ in. by $\frac{1}{2}$ in. in extent. Mr. Leslie Paton suggested a diagnosis of rodent ulcer, and, with that idea, he recommended the patient to have radium treatment. But Mr. Pinch, of the Radium Institute, declined to apply radium as he did not regard it as rodent, an opinion which I shared and which was confirmed by Sir James Galloway. But we were puzzled as to the causation; Sir James Galloway suggested it was probably inflammatory, a reaction of the skin to what had been present earlier, and perhaps accentuated by the operative interference. I can feel no enlargements of glands. I am convinced it is not rodent ulcer, but am unable to supply a diagnosis. There is no history of syphilis, and infection is very improbable.

The PRESIDENT counselled searching for the *Spirochæta pallida* and having a Wassermann reaction done. It was probably a syphilitic lesion, possibly primary: it was exactly like primary syphilitic lesions of the eyelid which he had seen. Perhaps there had been an inoculation of syphilis on the top of a previous inflammatory condition. If both the investigations he suggested proved negative he would repeat the Wassermann test, and, indeed, do so weekly for several weeks. After the investigation he would give a little mercury.

Case of *Morphœa Guttata et Areata*.

By E. G. GRAHAM LITTLE, M.D.

THE patient is a man, aged 45: eighteen months ago he noticed that the skin of his face caused him discomfort and trouble. There were broad and narrow bands of raised, very yellow, prominent infiltration. Six months ago he saw Dr. Sequeira two or three times, and he says that that expert's diagnosis was xanthoma. At that date it was more salient and more yellow than it is now. At present I think the condition is morphœa; it is strictly symmetrical, and the onset was very acute. Fresh lesions, of a guttate type, are appearing at the margin of the two sclerodermia patches on the chest. His general condition is good; he is a healthy and active man, but his dental condition is not above suspicion, and I have suggested his having his bad teeth removed. The worst case of sclerodermia I have ever seen—I showed it here three or four years ago—was that of a woman whose condition was so widespread that it might be called universal; she was so crippled for years that she could not even feed herself. Her teeth were removed, and then all the symptoms of sclerodermic tension disappeared. The skin is still glossy, but is no longer tense, and she can not only feed herself, but can play the piano again, a thing which was inconceivable earlier. Her recovery can only be ascribed to the removal of her septic teeth.

Dr. BUNCH said he had under care at present a child who had a large patch of morphœa on the leg the size of a Tangerine orange, and it was becoming white. When it started it was prominent and yellow, as was the lesion in the present case, and only during the last nine months had it become white. Smaller patches were now appearing, but these were white, not yellow, patches, and in that respect also his case resembled Dr. Little's.

Case of Hæmatolymphangioma.

By E. G. GRAHAM LITTLE, M.D.

THE patient is a girl, aged 12. She had a very large swelling under the chin almost filling up the space between clavicle and chin and giving on palpation the feeling of a "bag of worms" such as one meets with in varicocele. The skin over the swelling is bluish, and some very hard lumps (phleboliths?) can be felt in its substance. The tongue is considerably swollen, especially the left half, and it is studded with small persistent vesicles, rather like the case shown by the President at the last meeting.¹ All these features are probably congenital. She has further a large baggy swelling over the left scapula covered by healthy skin and without any discharge, the mass occupying an area about 6 in. by 4 in. This is of more recent development (some months). The patient is quite well developed otherwise, mentally and physically.

DISCUSSION.

THE PRESIDENT saw nothing against this being regarded as a large nævus-hæmangioma. The condition on the tongue consisted, almost entirely, of blood-vessels. The neck condition was a cavernous nævus, in which, he thought, calcification had occurred in places.

* Dr. BARBER thought the swelling over the scapula was a cold tubercular abscess.

Case of Darier's Disease.

By HENRY MACCORMAC, C.B.E., M.D.

THE patient is a woman, aged 39. She states the abnormal condition of the skin was first noticed when she was aged 14, as a roughness, and that from this state gradual progress has taken place until the present time. The eruption is roughly symmetrical and of extensive distribution. It is most distinctly developed on the temples, forehead, arms, under the right breast, and right thigh and leg, and is also present, though in slighter degree, on the ears, nasolabial folds, back and arms. The palms are pitted and also present small horny papules. No abnormal condition can be found on the tongue or nails.

The eruption in its most characteristic form is made up of greyish crusts among which are numerous papules with central depression containing friable substance. There are no abnormal sensations, and there is no history of a similar condition in any other member of the family.

Microscopic sections show the typical appearances met with in Darier's disease. The horny layer is distinctly exaggerated in places, and in this layer numerous "granules" can be seen. In the Malpighian layer characteristic "round bodies" are also present. There is some cellular infiltration of the dermis, but this does not present any unusual features.

The PRESIDENT did not think there could be any doubt as to the diagnosis, but he congratulated Dr. MacCormac on having made it, for the condition was so slight that only a good analytical examination would show this was anything out of the ordinary. It might easily have been passed over as simply an intractable dermatitis.

¹ *Proceedings*, p. 49.

Tuberculide treated with Novarsenobillon.

By H. MACCORMAC, C.B.E., M.D.

THE patient, a woman, aged 27, has suffered from an eruption on the arms and legs for the last two and half years. Apart from this her general condition is good: there is no family history of tubercle; an enlarged lymphatic gland in the left axilla of four years' duration forms the only evidence of tuberculosis, and its nature is dubious. On the arms the eruption has corresponded to the papulo-necrotic type; on the legs the disease has assumed the Bazin form.

Various remedies had been tried without any success until intravenous medication with novarsenobillon was undertaken. Three injections, the first of 0.6 gm., the second and third 0.9 gm., have been given, with very satisfactory results. On the arms complete healing has taken place, and on the legs very considerable improvement.

DISCUSSION.

Dr. GRAHAM LITTLE said he had tried novarsenobillon in some tuberculous conditions after reading Stokes's paper,¹ and among Stokes's cases were some of erythema induratum, which distinctly improved. He (the speaker) had a case of a girl with combined syphilis and tubercle, which had existed since early childhood. He gave her injections by Pollitzer's intensive method, 0.6 gm. every two days for three doses, and in three weeks the effect on both diseases was marvellous. In another case very extensive congestive lupus vulgaris of the face did remarkably well under injections of the same drug once a week.

Dr. BUNCH said that treatment by novarsenobillon was not always successful. He had under his care a boy whom he had shown before this Section with an extensive papulo-necrotic tuberculide, and six injections did him no good. Last year he died from tuberculous peritonitis.

Dr. F. PARKES WEBER did not think that salvarsan and neosalvarsan did much good for pulmonary tuberculosis and other internal tuberculous conditions, though cutaneous tuberculides and other non-syphilitic skin affections might be improved. That improvement was probably due to the effect on the nutrition of the skin, as it was unlikely that the tubercle bacilli were killed by the treatment.

Dr. BARBER said that since he read Stokes's paper he had treated all his cases of Bazin's disease in this way; also a few cases of papulo-necrotic tuberculide of the extremities. The effect of the treatment depended much on the individual patient. Patients in whom the signs and symptoms of active tuberculosis were not very evident usually did well with injections of novarsenobillon. On the other hand he had had one case of papulo-necrotic tuberculide, associated with tuberculous glands and disease of the lungs, in which a course of nine injections was of no apparent benefit. A case of the same type, however, in which active signs of tuberculosis were but little marked, did extremely well under it.

Dr. O'DONOVAN asked whether Dr. Barber's cases had been taken into hospital, cleaned up and fed. Such patients when so dealt with sometimes did well without novarsenobillon. In some cases the condition dragged on indefinitely. Adjuvant treatment was also of importance.

Stokes, J. H., "Clinical Studies in Cutaneous Aspects of Tuberculosis," *Amer. Journ. Med. Sci.*, 1919, clvii, pp. 157, 313, 522.

Dermatitis Herpetiformis.

By W. J. O'DONOVAN, M.D.

E. C., AGED 15, is a schoolboy, who on account of nervousness cannot sit for school or scholarship examinations. He has no brothers nor sisters; his father, a clerk, and his mother are alive and well. His past health has been good. In October, 1920, spots appeared on his chest and quickly attained a widespread distribution, appearing first as blisters and ending up as scabs.



On admission into hospital under Dr. J. H. Sequeira he presented (November 4) a polycyclic widespread bullous eruption on the trunk and limbs; the fingers, toes and scalp were free; the eyelids, as if rubbed and so infected and irritated, were red and scaly. The tongue, gums and buccal mucosa were natural. There was no adenopathy. The circles of eruption had pink glazed centres with yellow or white crusted margins. In the middle of these circles (*see* photograph) or on sound skin were solitary or grouped vesicles up to 1 cm. diameter full of clear yellow fluid.

On November 6, there was a new outcrop of blebs in the right axilla and outside the right arm; no pain; the patient was not ill.

On November 9, an *auto-inoculation experiment* was attempted. Fluid from a new clear abdominal vesicle was applied to a sound area of skin on the

right forearm, this site was scarified and allowed to dry without a dressing. On November 12, no reaction had occurred but on November 13 three miliary vesicles occurred at the scarified area and these enlarged, coalesced and crusted, as was usual. There was no similar vesicular reaction on scarified non-inoculated areas.

The boy was kept in bed on an ordinary diet, with a powder of zinc and calomel; continued new outcrops occurred so that in the mornings his night-shirt was often stuck in many places. While the outbreak was extensive he had a remittent pyrexia of 101° to 102° F., with a pulse of 120 to 128 and a respiration rate of 24 to 28. He was never severely ill, took his food well and did not suffer from itching.

A blood count made by the Clinical Laboratory on November 4 showed: Leucocytes, 17,600; polynuclear neutrophils, 72.5 per cent.; polynuclear eosinophils, 8.5 per cent.; small lymphocytes, 5.5 per cent.; large lymphocytes, 10.0 per cent.; large hyaline cells, 3.5 per cent.

Blood cultures on the same date were sterile; films from the blisters showed polynuclears, a few eosinophils and epithelial cells. Cultures: *Staphylococcus albus*.

There was no albuminuria.

The boy has steadily improved although no special benefit can be claimed from treatment by arsenic or by injections of horse serum. New and smaller outbreaks have occurred from time to time; to-day seen as clear bullæ in the axilla and as crusts upon erythematous areas on the forearms. Throughout—and this seems atypical—itching has never been a feature of the case, nor has the boy even during the pyrexial period complained of any notable symptoms.

DISCUSSION.

Dr. MACLEOD considered that the case was dermatitis herpetiformis, although the distribution was unusual. The fact that the vesicles were sterile—the secondary contamination being due to *Staphylococcus albus*, and the grouping of the lesions corroborated this view.

The PRESIDENT did not doubt the diagnosis, but the inoculation question was an interesting one. In the case of a man who had very acute toxic eczema with true gout at the same time, he found that by simply allowing his own serum from uninfected vesicles to drop on his skin, an urticarial wheal was formed, then a row of vesicles, then a bullous condition. He then tried to see whether the same result would happen if he drew off the material with a hypodermic needle and allowed it to trickle over his own arm, but there was no effect. The boy in the case under discussion was, he thought, sensitive to his own serum.

Dr. WILFRID FOX said he once made experiments in artificial blistering in these cases, and he frequently saw crops of bullæ round about, and beyond the area where blistering fluid had been applied. These artificial bullæ, however, did not contain an excess of eosinophil cells.

Lupus Vulgaris of the Ear Lobule.

By W. J. O'DONOVAN, M.D.

I AM showing this case principally to obtain suggestions as to treatment since the prognosis of long standing tuberculosis of the skin seems so hopeless and so tragic in its progressive deformity. Mrs. F. H., aged 43, a native of

South Wales, has had a swelling of her right ear since the age of 14. Married; husband alive and well. Had two children who died young; no miscarriages, no family tuberculosis. Had measles in infancy, has always been very nervous, and has been deaf ever since the attack of measles. Her condition has been treated by ointments off and on for many years, by zinc ionization for the last year and by two exposures to X-rays. I saw her first a week ago. Lobule of right ear enlarged, hanging down half an inch below that of left ear; it is swollen, flabby and purplish, on pressure with a diascop many yellowish miliary tubercles become visible. A circular area of brownish, slightly raised, induration showing lupus nodules in its advancing margin extends directly on to the adjacent cheek. The face, she tells me, has been affected for the last ten to twelve months, and because of this she came to London.

DISCUSSION.

Dr. KNOWSLEY SIBLEY considered the case essentially one of tubercular lymphangitis—a solid œdema due to blocking of vessels of the ear and of a more or less permanent nature. This patient had been under his care for some months. When she first came to him the size of the lobe of the ear was twice its present size. She had not had X-rays, but she had been ionized with zinc, and that had a very good effect. He did not expect that her state would ever be better than it was now. The condition on the side of the face was comparatively recent. He did not see any evidence of tubercular granulomata left on the skin of the ear, but there still were some on the cheek in the front of the ear.

The PRESIDENT said he had cut sections of lobes of ears like this. When lupus attacked the lobe of the ear it always enlarged as in this case—became indeed an elephantiasis. It was not a question of lymph-stasis, for the whole lobe of the ear would be seen to be made up of pale-staining epithelial cells, with no fibrous tissue left, and there would be very few plasma cells. For that condition he used the term "hypertrophic lupus," namely, where the hypertrophy was of the granuloma, as distinct from the verrucose type, in which the hypertrophy was in the epidermis. If a specialist in plastic surgery were consulted, he thought a presentable face would be the result.

Dr. H. G. ADAMSON regarded the case as one of typical lupus vulgaris of the lobe of the ear; such a swollen condition was not uncommon. As to treatment, he would first try painting with liquid acid nitrate of mercury. If success did not result from that he would thoroughly scrape and then cauterize with chloride of zinc. Whatever form of treatment was used, the lobe would be lost. Any plastic operation would be best done after the lupus had been cured.

Dr. MACCORMAC said that a similar case, that of a nursing sister, came under his notice in France. The condition had been thought to be a chilblain of the ear, but when the patient came under his observation it was possible to demonstrate the characteristic deposit of lupus vulgaris. For some time acid nitrate of mercury was used, but it was finally decided to excise a portion of the ear, and this procedure was followed by a very good result.

Dr. O'DONOVAN (in reply) said he had been much impressed by the after-history of these apparently innocent tuberculides; the patients went from one hospital to another, and ended up with horrible epithelionata, which demanded treatment on account of urgent hæmorrhage. In consideration of the views expressed, he would deal with the condition surgically.

Case of Lupus Erythematosus.

By WILFRID FOX, M.D.

THIS woman, aged 28, is married, and has no children. She has had the rash on her hands for four months and on the face for two months. On the face it has been intermittent, coming out only at menstrual times and vanishing in the intervals. She shows no personal signs of active tuberculosis, but there are scars on the neck. A brother who lived in the same house died of tubercle. She has had bad chilblains and very septic teeth. Only once have I seen such dense scarring in lupus erythematosus; the scars are easily knocked and become septic. I ask for suggestions as to treatment. My intention was to give her detoxicated tuberculin vaccine. I have had one or two cases under this treatment, but so far the results have not been encouraging.

Dr. H. G. ADAMSON counselled keeping the patient in bed several months; the more acute cases of lupus erythematosus often improved very much by mere rest in bed.

Section of Dermatology.¹

President—Dr. ARTHUR WHITFIELD.

Lichen Spinulosus with Folliculitis Decalvans.

By E. G. GRAHAM LITTLE, M.D.

THE combination is of great interest to me, because I showed the first instance of it two or three years ago. There were shown soon afterwards one by Dr. Dore, not quite so marked, and one reported by Dr. Wallace Beatty. I have not since seen a similar case.

I saw this patient for the first time in December, 1919, when there was no atrophy of the scalp, but she had the lesions of lichen spinulosus, which at the back of the ear were very well marked. There is an exaggerated keratotic mass on the skin behind the ear, which has slowly increased in bulk since I saw her. She has been seen in the interval by Dr. Sequeira, who agreed with the diagnosis of lichen spinulosus. She has the other interesting feature of definite atrophic folliculitis of the scalp, and—a feature which interests me very much—pronounced leucoplakia of the tongue and buccal mucosa. This tongue condition is so like lichen planus that I am not sure that it is not that. Indeed, lichen planus may be the explanation of all three cases. The present case is a very early example of follicular atrophy of the scalp: Beatty's case was a little more extensive, for practically the whole scalp was laid bare.

The suggestion has been made that lichen spinulosus is a juvenile type of lichen planus, a view with which I do not agree. This is not a juvenile case of lichen spinulosus, and lichen spinulosus is not common in adults. Whether these cases ought finally to be grouped as lichen planus remains to be seen; this case is a link which probably suggests that.

DISCUSSION.

Dr. J. H. SEQUEIRA said the patient had come under his care fifteen months ago. He then noted the association of follicular keratosis with leucoplakia of the tongue, and concluded that the case must belong to the lichen planus group. The folliculitis decalvans was a later feature, and the atrophic condition of the scalp was so characteristic that he did not think it could have been present when he had the patient under his observation. By request of the patient's family doctor he had had the blood examined by the Wassermann test. The result was completely negative. Folliculitis decalvans was present in one of his patients, a woman of middle age, who had no horny lesions of the hair follicles elsewhere. In a second case it was associated with follicular keratosis, and was evidently of the type described by Dr. Graham Little, Dr. Wallace Beatty and Dr. Dore. The present case appeared a link between these cases and

¹ At a meeting of the Section, held March 17, 1921.

lichen planus, and was of great interest. He was pleased to see that the patient's general health had greatly improved, in spite of the persistence of the cutaneous lesions.

Dr. S. E. DORE said Dr. Little was fortunate in securing this case, which showed three types of lesion. He had himself shown a case of folliculitis decalvans and lichen spinulosus, and also one of folliculitis decalvans with lesions on the ear, which Dr. Adamson had previously seen and diagnosed as lichen planus. He thought Dr. Little's suggestion that all the lesions found in the present case might be variants of lichen planus an interesting and valuable one.

Case of Neuro-fibromatosis.

By S. E. DORE, M.D.

THIS patient is aged 39, and at the age of 9 she first noticed a lump in the flexor surface of the forearm. Ten years ago numerous tumours appeared under the skin, principally on the forearms; she now has nineteen on the right arm and twelve on the left arm. They vary in size from that of a pea to a walnut, and project slightly above the surface, so as to alter the contour of the arm; they are slightly lobulated and soft, and there is slight bluish discoloration of the skin over some of them. There is no pain or tenderness, but the hands are slightly œdematous, and when she holds the arm up there is numbness of the limb. The tumours appear to be increasing in both size and number. I regard the case as one of neurofibromatosis, but leio-myoma has also been suggested as a possible diagnosis.

Case of Radium Burn.

By E. G. GRAHAM LITTLE, M.D.

THE patient is a man, aged 50. Ten years ago he had an application of radium in the lower part of his back for twenty-four hours, for, it is said, backache. The application resulted in a scar, which is clearly visible along the side of the spinal column. On the upper side of the scar now is a deep ulcer, which developed two or three months ago. The interest of the case lies in the very long period of quiescence since the radium application before the appearance of the ulceration. I understand there was no ulceration immediately following the radium application. I think it is now malignant.

DISCUSSION.

Dr. J. H. SEQUEIRA said he had seen similar conditions after application of both radium and X-rays. When the more deeply-penetrating heavy doses of X-rays were used, late necrosis was a not uncommon sequel. It was difficult to understand why the ulceration should be so long postponed. The only hopeful treatment was complete excision of the ulcer, followed by grafting of the area.

Dr. WILFRID FOX reminded the Section that ulcerations of similar character used to be met with before the days of radium and X-rays, and as any scar in this position over the spine, where it was subject to friction and irritation, might become epitheliomatous, it was, he thought, unfair to lay too much stress on the original cause of the scar.

Case of Dermatitis Herpetiformis.

By E. G. GRAHAM LITTLE, M.D.

SEVEN years ago this lady was bitten severely on the finger by a field rat, which hung on and bit a part of it off. She developed rat-bite fever, running a temperature for about a year after the bite, and she had an eruption during that time. The eruption she now shows began a year after, and has been almost continually present for the past six years. She is very susceptible to arsenic; she cannot take it in any form, and that makes treatment difficult. I have had various reports made on the case. There is pronounced indicanuria, also a high eosinophilia; the former was 23.5 per cent. on March 2, but to-day it is only 4 per cent. Eosinophilia has been regarded as a concomitant of dermatitis herpetiformis, but it is a very capricious feature, as shown by the difference in these readings. She has become ill and sleepless, and in a highly nervous state. She has an extensive eruption of vesicles with pigmentation of the skin and intense itching, symptoms which in my opinion place the case in the category of dermatitis herpetiformis.

Demonstration of a Method of detecting the Presence of Catalytic Enzymes in Infected Hairs.

By T. H. C. BENIANS, F.R.C.S.

THE hair is placed on a slide in a drop of hydrogen peroxide 20 volumes, covered with a slip and examined under the microscope. A vigorous effervescence, continuing for fifteen to thirty minutes, occurs when tinea infection is present. The hair itself is inert as regards the presence of catalytic enzymes, but the hair root contains them, and must therefore not be included in the preparation.

Similar enzymes are present in most bacteria, and may be found in the substrate on which they have been growing. I therefore think it possible that the method may be of use in detecting some infections of hairs when the causative organisms have themselves disappeared. I do not think the method equals the ordinary one of direct examination of the cleared hair, but an indirect method may at times be useful when the direct method fails. The method may also be applied to the examination of epithelial scales from the body, and shavings of the nails, but not to scales from the scalp on account of the extensive bacterial flora normally present there, especially in adults. Hairs from purulent processes are not usually suitable on account of the catalytic enzymes in the pus cells.

DISCUSSION.

Dr. MACCORMAC asked whether he understood Mr. Benians to say that the enzyme persisted after the disease had been cured—i.e., after the fungus had disappeared.

Mr. BENIANS (in reply) said he had not intended to give the impression suggested by Dr. MacCormac. His meaning was that when the infecting agent had gone, the enzymes, which had been extra-cellular, either from the degeneration of the cell or from the start, were often still found in the substrate, when the organism which formed them had disappeared. He did not mean to imply that it might be expected as a general rule in ringworm.

Case of Monilithrix.

By W. KNOWSLEY SIBLEY, M.D.

J. C., A HEALTHY girl, aged 5, the youngest of three. Mother and father living and well. There is no other known case in the family of hair trouble. At birth the hair was dark brown and normal in appearance. At 1 month old it all came out and has never grown properly since. The hair of the head has a fair flaxen tow-like bushy appearance, being 1 to 2 in. long on the vertex of the scalp, but only about $\frac{1}{8}$ to $\frac{1}{4}$ in. in length over the occipital, parietal, and margin of the frontal regions. The hairs are very brittle and readily break off at various lengths with slight friction. The eyebrows, especially the outer parts, are very deficient, and the hairs here present the same microscopical appearance as those of the head. The eyelashes are very dark and rather short and very curved. They do not present any of the monilithrix structural appearance. The whole scalp is dry and presents an appearance of keratosis pilaris, and that condition is also present on the arms and thighs. The teeth are well preserved, rather small with considerable spaces between all the incisors and canines.

DISCUSSION.

Dr. S. E. DORE asked whether Dr. Sibley had any suggestion to offer as to the cause of the condition. It was often associated with keratosis at the mouth of the hair follicle and he thought it might be due to irregular cornification affecting the hair inside the follicle. With regard to treatment, he believed some cases of monilithrix had been epilated by X-rays but without success, and he asked if Dr. Sibley proposed to adopt this method.

Dr. SIBLEY replied that he had never seen a child with this condition X-rayed, but he did not think it could do any harm and might be worth trying. He thought it desirable to give a small dose of thyroid, as the skin generally was dry and harsh.

Two Cases of ? Pityriasis Rubra Pilaris.

By M. G. HANNAY, M.D.

CASE I.

THE patient is a single woman, aged 21, a clerk by occupation. Her father is alive and healthy, aged 65: her mother dead, she suffered from gastric ulcer. She has seven sisters and one brother, the eldest sister has suffered from psoriasis. One sister is delicate, and is supposed to have "lung trouble." Apart from this there is no history of skin disease, tuberculosis, "lymphatism" or other trouble in the family. With the exception of bronchitis at the age of 10 she has always been healthy.

On examination the general condition was good. The heart, lungs, and other organs were normal. The blood and urine revealed nothing abnormal. Examination of the faeces showed no unusual bacteria, and cultures gave a mixed growth of *Streptococcus faecalis* and *Bacillus coli*. Von Pirquet's reaction was negative.

The eruption began in the summer of 1918, with slight redness and sealiness on the forehead, thought at the time to be due to sunburn. Since then the condition has been steadily progressing in the summer and improving

or remaining stationary in the winter. She gives the history that she used to freckle severely, but this tendency disappeared almost completely at the same time that the eruption was first noticed. There has been very little itching throughout.

In August, 1920, when I first saw the patient, the eruption was limited to the exposed portions of the face and front of neck and chest, with some papules on the arms. There was a band of normal skin, apparently protected by the coiffure, just below the margin of the scalp, and another band below the chin. On the front of the chest the eruption was limited to a V-shaped area corresponding exactly to the opening of the modern blouse. These areas were more or less uniformly red and scaly, but at the margins were very numerous discrete papules. On the upper and outer aspects of the arms were a number of isolated acuminate follicular papules, the size of a pin's head, brick-red at the base, capped by a horny plug, and giving a grater-like feel to the finger.

A section of one of the papules from the arm under the microscope shows changes chiefly in and around the hair follicle. There is a hyperkeratosis, the mouth is widened and filled with a horny plug which projects above the surface. In the corium, in the neighbourhood of the follicle, the vessels are slightly dilated, and there is a patchy infiltration of small cells.

Dr. GRAHAM LITTLE (Chairman) said the history of psoriasis in the family was very interesting if the diagnosis of the present condition was correct. But he would find it difficult to make that diagnosis as the case was now presented. He brought one case of the kind to the International Congress in 1913; he had seen the patient three months previously, and when the meeting was held the condition had practically cleared up, so that as an exhibition case it was useless. Cases seemed capable of spontaneous cure. On the other hand he had had cases which were very intractable. The present patient gave a history of psoriasis in the family. Dr. Adamson believed that pityriasis rubra pilaris was associated with, even if not a form of, psoriasis. In the first—and most serious—case he had had there was a strong history of psoriasis in two members of the family.

CASE II.

The patient is a male, married, aged 55. His father, a healthy subject, died of cholera; his mother was also healthy, died from cause unknown. He has one brother and two sisters alive and well. Wife, healthy until she had a stroke a few years ago. He has eight children living and healthy, one child was stillborn. There is no history of skin disease, tuberculosis, or other constitutional trouble in the family. He was born in Galicia, and had lived in England for forty years. His occupation is that of a dealer. He is well developed, and has always been a particularly strong man. There is no history of any definite illness but he has had some dyspepsia during the last few years. On examination the heart, lungs, kidneys and other organs appear normal.

The eruption appeared abruptly on October 27, 1919, and the patient is inclined to attribute it to his having partaken rather freely of sardines and brandy the evening before. The distribution was at first over the trunk, arms, hands, thighs and legs. From the patient's description it seems to have resembled a scarlatiniform erythema. It was irritable, and was followed in a few days by peeling, leaving a reddened and scaly surface. The condition gradually progressed. He eventually came under the care of Dr. Parkes Weber, who showed the patient before the Clinical Section on February 13, 1920, as a typical case of pityriasis rubra pilaris, pointing out that it was possible to

make the diagnosis blindfold by feeling the follicular papules on the dorsum of the proximal phalanges of the fingers.

The patient first came under my care in June, 1920, when there were still fairly typical papules on the backs of the phalanges, the wrists, and lower abdomen, but nearly the whole of the rest of the trunk and limbs was involved in a rather severe desquamative dermatitis, representing the stage of "homme rouge." Itching was severe, and has been a marked feature throughout.

He was admitted to the in-patient department under Dr. Griffith, and he quickly improved. The improvement has steadily continued.

At the beginning of this year the eruption was chiefly confined to the trunk, and consisted of small irregular flat patches of scaly erythrodermia, some of them isolated, some of them touching or running together in such a manner as to recall the pattern-like eruption of some cases of parapsoriasis.

The case is interesting because of the history of the onset, and the varied phases presented by the eruption, although at the present moment the condition is not characteristic of the disease.

? Basal Cell Carcinoma.

Shown by HENRY MACCORMAC, C.B.E., M.D.

(For Dr. R. C. HARKNESS and Dr. R. D. PASSEY.)

THE patient states that the eruption was first noticed by him about nine months ago as one or two nodules; since then their number has steadily increased. The lesions are confined to the trunk, and consist of hypodermic tumours on an average the size of a hazel nut. The skin over them is of normal appearance.

As I have only had an opportunity of examining the patient to-day for a few minutes, I am not able to add further details to the clinical description. The chief interest however seems to lie in the microscopical sections exhibited. The new growth appears to be made up of spheroidal cells, in some places packed together in an alveolar arrangement, in others showing a central canal in which blood elements are present as in a blood-vessel. In both cases the new growth is limited by a well marked layer of flattened endothelial (?) cells. From these appearances, and from the position of the growth it would seem to be more correct to regard the tumour as an endothelioma of the type included under the group named Perrin's sarcoma, rather than as a basal cell carcinoma.

DISCUSSION.

Mr. McDONAGH said he had under observation two years ago a man who presented lesions the replica of those seen in case exhibited. They multiplied rapidly and in a few months the patient died. The conclusion arrived at from a microscopic examination was that the lesions were sarcomata of the nature of endotheliomata.

Dr. W. J. O'DONOVAN said that the patient shown appeared to him to be of a type not at all uncommon in the post-mortem room in which no primary growth had been demonstrated during life and in which carcinoma of the stomach or prostate was found at the sectio cadaveris although localizing symptoms of the primary growth had been entirely absent during life. Clinically, from the subcutaneous nature, the wide yet discrete distribution, and the uniform type of the nodules, he would have diagnosed this as a case of secondary carcinoma of the skin. *Microscopically*, although in one of the two sections the cells were closely packed, with a very imperfect acinar arrangement,

yet, he would diagnose the growths as secondary carcinomatous deposits. In one section large distended tubules were seen among the solid irregularly shaped processes of polygonal cells: the tubules of growth were lined by one or many layers of high columnar epithelium, sometimes showing a very regular arrangement indeed; many of the tubules were distended by homogeneous secretion.

[*Addendum by Dr. O'Donovan.*—In 1920, of thirteen cases of subcutaneous nodules sent for microscopical examination to the Pathological Institute of the London Hospital the primary focus could be ascertained clinically in eight; in the remaining five cases, their metastatic carcinomatous nature was plainly demonstrable.]

Case of Lupus Erythematosus (Juvenilis).

By W. J. O'DONOVAN, M.D.

THE patient is a boy aged 8, who at the age of 7 in June, 1920, was noticed to have a rash below his left eye which has been treated as eczema. He appeared for the first time at Dr. J. H. Sequeira's clinic at the London Hospital a week ago, when the diagnosis of lupus erythematosus was made at once. The boy's general health is good, there is no history of any infection excepting measles in early childhood; there is no albuminuria, no adenitis, and no chilblains; on both cheeks and on the nose and ears are numerous discrete discoid patches of lupus erythematosus. The extreme youth of the boy is my reason for showing him at this meeting.

Dr. GRAHAM LITTLE (Chairman) said the condition was very rare in a child. Though he had had charge of skin cases at Shadwell Children's Hospital for 25 years he had never before seen a case in a child. That fact was very strongly against the association of lupus erythematosus and tuberculosis, the latter disease being very common in childhood.

Carcinoma Cutis in Anthracene Workers.

By W. J. O'DONOVAN, M.D.

ALTHOUGH at the London Hospital we have long been familiar with the clinical effects of work amongst tar, yet until the last year no cases of carcinoma among anthracene workers have been seen by Dr. J. H. Sequeira or by myself. The patient shown, I. Y., aged 62, has only been laid up once by a crop of boils on the back of his neck three years ago. For the last five years this man has worked in the yard of a riverside alizarine factory in the East End of London, where, after many years of freedom, three cases of this kind have occurred in the last twelve months, and all of which have attended the skin department of the London Hospital. In the factory yard he unloaded boxes and sacks of anthracene cake, a green moist amorphous powder (shown) containing 40 per cent. of pure anthracene and smelling strongly of cresols. Anthracene $C_{14}H_{10}$ is found in the higher boiling portions of the distillate from coal tar; pitch is the residue.

For twenty-five previous years I. Y. had worked as a pitch breaker, using a pick and shovel to break up beds of pitch and load it into barges, and at this work he had suffered from conjunctivitis due to pitch dust.

The patient shown to-day is a well covered sturdy grey haired man. His face is deeply bronzed, his forearms are brown, his covered skin is quite white. On the forearms are many small pink telangiectases and many disseminated

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minute, grey, hard follicular keratoses. On the back of his right wrist is an irregularly circular, raised, flat tumour with rounded overhanging edges and an ulcerated granular slightly scabbed surface. In its highest part it is 0.5 cm. above the skin and it is not adherent to the deeper structures. It is painless and not tender. The growth began six months ago as "a small wart with a black top" and the patient attributes its steady growth to knocking the top off against a tub. There are no other warts on his body and the regional epitrochlear and axillary glands are not enlarged. *Microscopically* the lesion is a squamous-celled carcinoma. None of our cases have had pain, none have had adenopathy and all have been of recent growth; unlike the tar carcinomata none have shown multiple carcinomatous growths.



Squamous-celled carcinoma in an anthracene worker, aged 62.

Dr. J. H. SEQUEIRA said he had seen only the three cases of the condition to which Dr. O'Donovan had referred. They had not been able to discover if there were any changes in the process of manufacture. More attention had recently been directed to tar carcinoma because such cases were now notifiable to the Home Office.

Section of Dermatology.¹

President—Dr. ARTHUR WHITFIELD.

Case of Lupus Erythematosus with Sclerodermia.

By J. H. SEQUEIRA, M.D.

THE patient, an unmarried lady, now aged 35, was born in South Africa. She had "gastric" trouble in childhood but had had no serious illness except measles, although she was "never strong." In 1906 she suffered from bilateral blepharitis. In 1911 she came to this country for advice as a persistent red infiltration had developed along the edges of both lower lids. She was seen by Mr. Waren Tay and by Mr. Treacher Collins, who were both of the opinion that the trouble was tuberculous. A little later the eruption spread across the root of the nose. I treated the eyelids with radium, and the eruption cleared up leaving a soft scar with slight ectropion. The lesion at the root of the nose was treated by the Finsen light and ultimately cleared up. The patient then went home to South Africa.

In 1914 she returned to England for further treatment and again went home. In 1917 the fingers of both hands and the ankles became swollen in the spring, and the fingers have become progressively stiffer ever since. In 1919 she came again to this country and the appendix and an ovarian cyst were removed by Dr. J. S. Fairbairn of St. Thomas's Hospital.

The fingers and thumbs are purplish, swollen and stiff, the skin is immobile and cannot be pinched up. The right hand is worse than the left. The left hand can be clenched except that the first finger cannot be made to reach the palm. On the right hand none of the fingers can be made to touch the palm. Both palms are supple and moist; the wrists are free. The patient feels the cold intensely, and blisters continually develop on the tips of the fingers.

There is no alteration of sensation, tactile or thermal. Radiographs show atrophy of the terminal phalanges of three fingers. There is also evidence of calcareous glands at the root of each lung. The Wassermann reaction is negative.

In 1920 a quadrilateral patch of redness and scaling developed over the right mandible. This began as a small scaly spot and is now $1\frac{1}{2}$ in. in length by 1 in. in diameter.

The patient had been treated for the sclerodermia with polyglandular extracts by Dr. Hugh Smith of Cape Town, but without benefit.

Case of Sclerodactyly.

By J. H. SEQUEIRA, M.D.

THE patient, a single woman, aged 50, remembers no infantile ailments, but when a young girl she had frequent "whitlows." By occupation she is a machinist.

¹ At a meeting of the Section, held April 21, 1921.

Two years ago both hands swelled considerably in the summer. The swelling passed off in a month leaving the fingers stiff. They have been stiff ever since but the condition has not materially altered. She can separate the fingers half an inch only. She cannot bring the thumb across the closed fist nor can she clench the hand. The wrist-joints are practically immobile, but they are not deformed. Both wrists have a smooth contour and the fingers are held straight, the terminal phalangeal joints being slightly flexed.

The skin of the fingers, hands and wrists is hard, fixed and not mobile. There is no pitting. Both forearms are affected, the left for about one eighth of its length, the right for half its length.

On the manubrium sterni and the inner third of the left clavicle, is a pale stiff sclerodermic area, the size of the palm of the hand.

There is no evidence of Graves' disease nor of myxœdema. There is a seborrhœic eruption on the face and neck and behind the ears, but there is no evidence of scleroderma there.

X-ray photographs do not reveal any affection of the bones. The blood was found normal upon examination. The urine was slightly alkaline but free from albumin and sugar. The Wassermann reaction was negative.

Case of Xanthoma.

By J. H. SEQUEIRA, M.D.

THE patient is a married woman, aged 46. Her general health has been good. There is no history of jaundice or other liver affection.

The eruption began twelve months ago in the form of yellow "pimples" on both knees, later the elbows were affected, and for some months both hands have been involved.

On each knee there is a raised nodular plaque of a yellowish brown colour about the size of a two-shilling piece. The patches are not tender nor painful and are freely movable. On each elbow there is a raised patch of the same character, about the size of a shilling. On the palms and palmar aspects of the fingers and thumbs there are numerous flat yellowish lesions the size of a split pea. The individual papules are well defined and the skin between them is healthy. The nails are unaffected. The urine is free from albumin and sugar, and there was no abnormal quantity of indican. The blood count did not reveal any abnormality. The Wassermann reaction is negative.

The eruption closely resembles the type of xanthoma met with in association with glycosuria.

Case of Granuloma Annulare.

By E. G. GRAHAM LITTLE, M.D.

THE patient is a boy aged 12. The lesions on the left hand are good examples of early granuloma annulare, and show the pearly, isolated sago-like lesions arranged in a ring, which I regard as the first sign of the disease; the ringed arrangement, I think, generally comes later, and it forms an important part of the symptomatology of the disease; one would hesitate to make a diagnosis in the absence of some ring formation. I think that the disease has tuberculous associations, and I see that in his text-book Darier holds the

same view. In this boy's case the condition has persisted for nine or ten months; it is not involuting in any way, but is inclined to appear in fresh places on the knuckles of the left hand, those of the right hand having been first affected.

Case of (?) Diphtheria of the Skin.

By AGNES SAVILL, M.D.

THIS girl has had a slight crusting and soreness at the end of the nose for four years. In 1917 she went to the Middlesex Hospital, and she was told she had diphtheria of the nose. She was sent to a fever hospital, and there, apparently, she was injected with antitoxin. She was in the hospital for more than six weeks, and at date of leaving there was little crusting left on the nose. Ulceration had, however, recurred in the last four months, and a pure culture of diphtheria bacillus had now been obtained by Dr. Embleton from the base of the ulcer. I am trying diphtheria vaccine; she first had 10 millions, after four days 20 millions, and yesterday 40 millions. She already looks much better in herself, though the local improvement is not so marked. The swelling and redness between the ulcerated areas has been reduced. Possibly there may be lupus or other disease present.

Dr. MACCORMAC said he remembered this patient at the hospital; he considered the condition was lupus vulgaris. He thought it was desirable in such cases to consider whether the presence of such a parasite might not be accidental. Unless inoculations into guinea-pigs were made, it was in many cases impossible to separate these spurious types from the true diphtheria bacillus.

A Condition somewhat resembling Lupus Pernio in a Child.

By F. PARKES WEBER, M.D.

THE patient, a boy, aged 2½, shows a remarkable condition of his face, hands and feet. This condition, in regard to the hands and feet, might almost be termed "acrodermatitis chronica mutilans." There is extreme redness, sometimes associated with lividity, of the cheeks and chin. On the cheeks there are also fine hair-like superficial telangiectases. The skin of the cheeks is slightly scaly, and feels slightly thickened and infiltrated when one pinches it up. The edges of the pinnae of the ears are very hyperæmic and also scaly, as in the subjects of so-called "chilblainy circulation" during winter. There is ozæna, with an offensive muco-purulent discharge from the nose, the bridge of which is very depressed. The arms and legs show red, sometimes livid, reticular mottling. The hands present a very mutilated appearance, especially the right hand, owing to the tips of some of the fingers having been lost by gangrene or ulceration. The skin of the hands has sometimes been swollen and red or cyanotic, but lately has become paler and is less turgid. None of the toes have been lost, but the feet have been swollen and red or livid, like the hands; in the sole of each foot there is an irregularly shaped, chronic ulcer. Lately the feet have been less swollen and paler, and the ulcers have become smaller.

Otherwise the condition of the child does not appear bad. The mental development seems to be normal. There is occasional moderate fever, probably

connected chiefly with the nasal disease. There is no evidence of disease in the thoracic or abdominal viscera, excepting that a Röntgen skiagram of the thorax (Dr. James Metcalfe, March, 1921) shows a chain of enlarged hilus-glands on the right and some hilus-thickening on the left side; also slight shadowing in the mediastinal area. There is no enlargement of the superficial lymphatic glands, nor of the liver or spleen. The urine is free from albumin and sugar. Blood-count (March, 1921): Erythrocytes, 4,300,000, and white cells, 6,100, to the cubic millimetre of blood; hæmoglobin, 90 per cent. The differential count of white cells gave: lymphocytes, 38.3 per cent.; polymorphonuclear leucocytes, 61.7 per cent.; no eosinophils nor mast-cells were seen during the count. There was no poikilocytosis nor polychromatophilia, and no abnormal cells of any kind were found. Röntgen skiagrams of the hands, besides more or less complete loss of some of the phalanges (owing to the tips of some of the fingers having been destroyed), show small areas of imperfect calcification or of decalcification (such as, Dr. H. G. Adamson tells me, have been noted in cases of lupus pernio). A microscopical ("biopsy") examination of a small piece removed (February 28, 1921) from the edge of the chronic ulcer on one foot showed the corium to be permeated with lymphocytes, plasma-cells, and fibroblasts; no giant-cells and no tubercle bacilli were discovered.

Both of the patient's parents are apparently quite healthy, and their other child is a bright, well-built, normal-looking boy, aged 8½. The mother has had no other children and no miscarriages. The blood-serum of both the patient and his mother gave a negative Wassermann reaction on two occasions. This was when the patient was under Dr. E. A. Cockayne's care—previously to October 22, 1920, when he first came under my care. Dr. Cockayne also kindly informs me that an acid-fast bacillus was discovered in the nasal discharge. For the early history of the case I must refer to Dr. Cockayne's account.¹ When Dr. Cockayne showed the case (January, 1920) I agreed with him that it was one of a kind of sclerodactylia. Afterwards, in spite of the patient's early age, I thought that it was allied to lupus erythematosus, and Dr. Adamson suggested that it more nearly resembled lupus pernio. The symptoms in the left hand apparently commenced at 3 weeks of age. The offensive nasal discharge was first noticed at the age of 10 weeks, and has continued on and off since then. The child was breast-fed for the first seven weeks of life, and then brought up on various milk-foods. There seems lately to have been a slight improvement under arsenical treatment. A thorough trial of mercurial treatment was made by Dr. Cockayne, but with no obvious benefit. Benzyl-benzoate, pituitary gland substance (by the mouth), and adrenalin (subcutaneous injections) have also been given, but without any striking good result. The child's weight on October 25, 1920, was 1 st. 3 lb. 1 oz.; and on March 14, 1921, it was 1 st. 5 lb. 11 oz.

DISCUSSION.

Dr. J. H. SEQUEIRA asked whether there had been gastro-intestinal trouble in this child. [Dr. WEBER: Very little.] He was particularly interested in this case as he had just read a paper in the *Medical Journal of Australia*² by Dr. Jeffreys' Wood upon a condition called erythrœdema by Dr. Swift of Adelaide. The author gave Dr. Still as his authority, that the condition was recognized in this country. It occurred in young

¹ *Proc. Roy. Soc. Med.*, 1919-20, xiii (Sect. Study Dis. Child.), pp. 50-52.

² *Med. Journ. Australia*, February 19, 1921, p. 145.

children suffering from gastro-enteritis who developed huge chilblain-like swellings of all the extremities. Dr. Swift gave it the name of erythraedema because the extremities were red and swollen. Dr. Sequeira regarded the present case as an exaggerated instance of this. He considered it a toxic condition. When he had been attached to a children's hospital he had seen the condition occasionally. To be sure there had been no misunderstanding he (Dr. Sequeira) asked Dr. Still to read Dr. Wood's paper and he was good enough to allow Dr. Sequeira to go to Great Ormond Street Hospital where he showed him an instance, less marked, as the terminal phalanges had not lost tissue, but were blue and swollen.

Dr. H. G. ADAMSON said Dr. Weber asked him to see this patient in hospital. He had never seen anything quite like the condition before, except two or three cases of lupus pernio in adults; the lumpy masses on the cheeks, hands and feet in this child were very suggestive of that disease. There was no case of lupus pernio on record of the age of this patient. The bony loss might be simply an exaggeration of what was usually seen in lupus pernio.

Dr. PARKES WEBER (in reply) said that if the present case was really an exaggerated form of erythraedema, it must be the only case on record anything like it. In most of the cases published as erythraedema recovery had taken place, he thought.

Two Cases of Rodent Ulcer.

By H. MACCORMAC, C.B.E., M.D.

THE first patient is a woman, aged 50. She states that fifteen years ago she noticed what she terms a little wart on the right ear; it remained without marked change until four years ago, when it began to ulcerate and to spread slowly. When she was seen, some five months ago, there was considerable ulceration involving the cartilage. The lesion measured 4 cm. horizontally and 2.5 cm. vertically; the typical appearance, the rolled edge, of rodent ulcer was present at the margin. On November 23 the affected area was exposed to the gamma rays of 3 grm. of radium for four and a half hours, the screening being so arranged as to cut off all but the most penetrating rays. Within four weeks there was very considerable improvement, although there is still active carcinoma present.

The next patient, also a woman, is aged 64. She came under observation in November, 1919. There was then an extensive hypertrophic carcinoma over the left frontal region about the size of a walnut, considerably raised in the centre. The consistence suggested a resemblance to that of raw potato. The patient had noticed the beginning of the disease eight years ago, and a more rapid spread during the last few years.

In this case applications of X-rays were first given. These exposures were followed by improvement. The actual cure, however, had been brought about by the use of 20 mgr. of radium applied for one and a half hours.

Two interesting features may be noticed in this case; first, the patient developed at one period an indurated lymphatic gland in the pre-auricular region. This had all the appearance of a metastasis, but its inflammatory nature was proved by its ultimate complete disappearance. Secondly, comparison of this case with the first demonstrates that it is not necessary to employ massive doses of radium for the cure of extensive skin carcinomata.

Case for Diagnosis.

By S. E. DORE, M.D.

THE patient, a woman, aged 60, presents two small symmetrical patches on the extensor aspects of either forearm, of two months' duration on the left arm, and six weeks' duration on the right arm, consisting of a discoloured centre of a red or purplish colour without induration, surrounded by hard raised pearly papules, which had apparently resulted from the breaking up of a continuous edge. The whole patch has the appearance of having evolved from a single raised lesion which has undergone involution in the centre and spread at the periphery, and this course of events is confirmed by the patient. The diagnosis suggested is an unusual type of *granuloma annulare*; alternative suggestions put forward by other members being those of persistent erythema and a manifestation of late syphilis.

Case of Schamberg's Disease.

By S. E. DORE, M.D.

THE patient is a healthy woman, aged 32. The eruption began two months ago as scaly, brown patches on her knees, which spread gradually to the upper part of the thighs, and downwards to the ankles. It consists of burnt sienna coloured patches and "cayenne pepper" points, not disappearing on pressure, forming a continuous but patchy eruption extending over the anterior tibial regions and the anterior surface of the thighs, with scattered lesions on the posterior and lateral aspects. Amongst the patches, especially on the legs, are some superficial dilated venules, but no large varicose veins. There was some itching at first, but this ceased after the use of a mild astringent lotion. The appearances seem to correspond in every particular to the peculiar progressive pigmentary disease described by Schamberg. The condition appears to be more common than the small number of recorded cases lead one to believe. Exceptional features are the occurrence in a woman (most, if not all, of the reported cases having occurred in males), and the presence of itching.

Case of Rodent Ulcer.

By A. WINKELRIED WILLIAMS, M.B.

(Shown by E. G. GRAHAM LITTLE, M.D.)

PATIENT, a male, aged 29, with a growth on the left lower eyelid, which Dr. Williams has regarded as rodent ulcer, but the small swelling is softer than is usually the case with rodent ulcer. Three doses of X-ray were given at suitable intervals (December 18, January 12, February 10). After the third treatment the swelling has materially diminished but has not disappeared.

Case of Dermatitis Herpetiformis.

By G. W. SEQUEIRA.

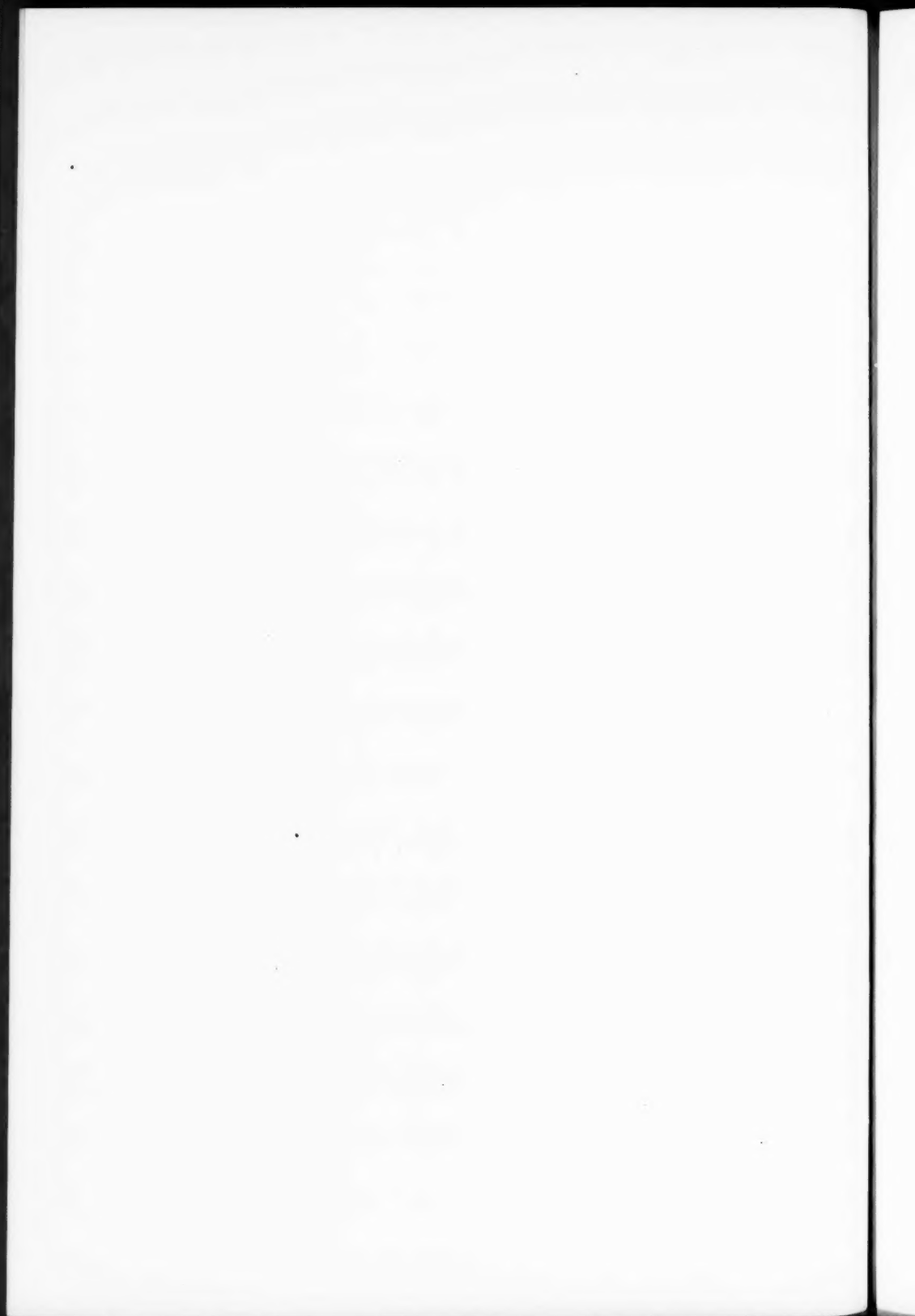
THE patient is a school teacher, aged 48, who has suffered from the malady for the last eight years. It commenced on his scalp as an irritable rash, followed by erythematous patches and blisters on the neck. Vesicles and papules soon appeared on his chest and quickly attained a widespread distribution. His general health has been fairly good. All carious teeth were extracted last January but this has not been followed by any amelioration in his symptoms. Two years ago he was in bed for a week with influenza, and during that time he was much relieved of his subjective symptoms, but on his getting about again they all returned. He has had very varied treatment but with little benefit till lately. Arsenic, which he has taken on many occasions, has given him temporary relief at times, but the result of such treatment has never been very striking.

Recently he has been taking antimony in conjunction with arsenic. At the present time he takes 6 minims of vinum antimoniale and the same quantity of liq. arsenicalis after food three times a day. This has been followed by marked improvement. The local application of lenigallol and zinc paste has also been of great service to him.

Case of von Recklinghausen's Disease.

By AGNES SAVILL, M.D.

THIS girl presents the classical text-book symptoms of von Recklinghausen's disease. It was first noted at the age of 14, the age at which the disease usually becomes manifest. She presents large and small pigment patches, soft and hard fibromata, some of which are tender, others not. This girl is the least physically developed of all the members of the family. Ever since the disease commenced she has felt tired and ill, but she has no mental deficiency.



Section of Dermatology.¹

President—Dr. ARTHUR WHITFIELD.

Case of Mycosis Fungoides.

By GEORGE PERNET, M.D.

THE patient is a man aged 55. The disease started on the arms two years ago, and now involves the skin from head to foot, with small areas of normal skin here and there, especially about the trunk. The case is very characteristic of mycosis fungoides—redness, infiltrations and tumours. My object in showing the case is to call attention to the beneficial action of sulphate of quinine, which I ordered in an effervescing form, viz., 3 gr. ter in die, on the skin generally. Although the patient has only been under treatment for a fortnight, I have given quinine in this case on the strength of the great improvement which followed its administration in the case of a woman under my care with mycosis fungoides in an earlier stage, not only *quâ* the skin, but also from the point of view of the patient's general health and well-being, accompanied by increase in weight. I consider that quinine should be given a trial in this disease.

Diphtheroid Ulceration of the Skin.

By E. G. GRAHAM LITTLE, M.D.

THIS patient is a lady, aged 40, married. There is no syphilitic history: two negative Wassermann reactions have been obtained. For several years she has had a chronic ulceration affecting the nose, with a somewhat deep sulcus on the right nostril, usually covered with scabs. I considered syphilis and tuberculosis; but since Dr. Savill showed her case of diphtheroid infection I have had a culture made from one of the scabs, and the bacteriologist reported that it gave a pure growth of diphtheroid organisms. Whether that explains the ulceration is a matter of controversy; I believe it does. I have found some notes of thirty years ago of several cases I saw at Shadwell Children's Hospital of extensive ulceration in young children, giving diphtheroid cultures. One confirmation of the present case would be its response to specific vaccine therapy. You will remember a case I showed at the Section some months ago, of ulceration of the foot, in which Dr. Matthews, of St. Mary's, was able to grow a pure culture of what apparently was Klebs-Loeffler bacillus. That had resisted all kinds of treatment, but it has done very well under vaccines prepared from the organisms so obtained.

¹ At a meeting of the Section, held May 19, 1921.

DISCUSSION.

Dr. J. H. SEQUEIRA asked if members had seen paralysis following these lesions, said to be due to "diphtheroid" bacilli.

Dr. G. PERNET mentioned a case of dermatitis gangrenosa infantum associated with paralysis of the palate and diaphragm, ending fatally.

Dr. MACCORMAC quoted a case of an extensive granuloma which began in the scar of an appendicectomy. The condition was attributed to a diphtheroid organism which was isolated from the lesion but he was able to show that the infection was really due to a streptothrix.

The PRESIDENT said that with modern bacteriological knowledge the profession had arrived at a rather unsatisfactory stage as regards the diagnosis of a disease by means of specific vaccine treatment. Ten years ago he would have agreed with Dr. Little that if a lesion yielded to the use of a specific vaccine prepared from the source, then the lesion was due to the organism cultivated. At that time the present knowledge was wanting, and he thought that this assumption was no longer justifiable owing to the experience of the use of non-specific vaccines and the production of protein shock. He suggested that for the future after preparation of the autogenous vaccine it would be well before using it to try the effect of some vaccine which undoubtedly did *not* contain the organism cultivated from the lesion. If the non-specific vaccine produced effects comparable in value with those obtained by the subsequent use of the autogenous vaccine then no conclusion should be drawn as to the lesions being due to the organism in the autogenous vaccine. If on the contrary the non-specific vaccine was without effect and the autogenous produced great improvement, one might take that as evidence that the organism in the autogenous vaccine stood in causal relationship to the lesion.

Case of Adenoma Sebaceum.

By E. G. GRAHAM LITTLE, M.D.

PATIENT, a girl, aged 13. She has had the eruption since early childhood, and at present the characteristic semitranslucent small tumours are thickly distributed about the cheeks, in the sulcus between the cheek and nose, and on the nose. The majority of the lesions are of the red type ("Type Pringle" of French authors), but there are also several quite pale tumours (Balzer's type). In addition there are several soft fibrous padlike colourless patches on the skin over the sacrum. The child is a particularly bright, clever and successful student; there are three other children, who are normal.

Case of Congenital Hypertrichosis.

By J. H. SEQUEIRA, M.D.

PATIENT, a girl aged $2\frac{1}{2}$, the youngest of five. The other children show no abnormality. The child was born at full term, the first teeth appeared at eight months, and she walked at eighteen months. The face is covered with fine downy hair, chiefly fair, in some parts a quarter of an inch in length. The body is covered with longer darker hair, and there is a similar growth on the limbs. The palms and soles and the flexures are free.

In 1909¹ I showed a parallel case to that of this infant. It is a curious

¹ *Brit. Journ. Derm.*, 1909, xxi, p. 68.

coincidence that this child, like the one previously shown, was born in Canada of English parents.

The PRESIDENT said a slight degree of the condition was very common in children, apart from tubercle. It usually disappeared at puberty, when the ovarian secretions became effective. He believed this condition was never seen in the male. Acquired hirsuties due to tubercle occurred in both sexes, but even this was more common in the female.

Photographs of an Extensive and Severe Case of Tuberculosis of the Skin successfully treated by means of Picric-brass Preparations combined with Heliotherapy.

Exhibited by J. H. STOWERS, M.D.

THE patient, a male, born in September, 1911, developed the disease in his fifth year. When seen in March, 1919, three years later, the whole of the right cheek was affected up to the margin of the lower eyelid, the entire nose being also involved. The integument was very vascular and œdematous and covered with thick septic crusts under which distinct nodules were visible. As surgical treatment was contra-indicated the patient was admitted into the Alton Hospital, Hampshire, under the personal care of the Medical Superintendent, Sir Henry Gauvain, who directed the treatment of the case. He remained in the Institution for eighteen months and was discharged in November of last year practically cured.

The PRESIDENT said this subject had been thoroughly discussed by the Section on a previous occasion, and the treatment had disappointed many of the more experienced members. The type of tubercle the present patient had was the characteristic ulcerating tuberculosis, which was curable by many methods not more destructive than brass paste. The method described by Dr. Stowers was useless for apple-jelly lupus. He regarded this as a treatment which had been tried and found wanting, and considered that it might be discarded.

Case of Epidermolysis Bullosa.

By H. W. BARBER, M.B.

PATIENT, a male aged 9. The chief point of interest about this boy's case is the family history. I have been able to trace twenty-two affected members of the family. In the present generation two boys and two girls are affected, and it was transmitted to them by the father, from whom it goes back to the grandmother's father. A full account will be published later in the *British Journal of Dermatology*.

Case for Diagnosis.

By H. W. BARBER, M.B.

PATIENT, a female, aged 42. In August last the patient had what she thought was a bite on the left cheek, and the condition gradually spread. I feel inclined to agree with those who think it is sclerodermia. My first impulse was to regard it as an unusual case of the granuloma annulare group.

So-called Multiple Idiopathic Pigment Sarcoma (Kaposi).

By J. H. SEQUEIRA, M.D.

PATIENT, a male, of English birth and parentage, aged 55. In 1911 he was operated on for obstruction of the common bile duct. There was no history of venereal disease, but the Wassermann reaction (Dr. Paul Fildes) was positive. In 1919 the patient noticed what he thought was a bruise on the left great toe, on the dorsal surface at the base of the nail. This lesion has not disappeared but has become hard and "like a corn." Twelve months ago a purplish raised lesion the size of a threepenny-piece appeared on the left calf, and four months later a similar spot developed on the left upper arm. A month ago a purple raised spot of similar size appeared at the end of the right great toe. On the right half of the soft palate there is a circular purplish spot the size of a sixpence. It is stated that this was observed about the time of the appearance of the first spot on the toe. The most characteristic lesion is that on the dorsal aspect of the great toe. It is raised, purplish-brown in colour and with a warty surface, and the size of a thumb-nail. The other lesions are flat, purplish plaques, the colour of which does not disappear on pressure. Two of the lesions (on the arm and leg) were excised and sent to Professor Turnbull for report. The following is the abstract of the report: Richly pigmented (iron) angiomatous granuloma. The histological changes are similar in kind to though much greater in degree than those found in lesions sent to us as "Kaposi's multiple idiopathic pigment sarcoma."

The case is shown because of the apparent metastatic lesions in the limbs and palate.

Case of Lichen Planus in a Woman, aged 47.

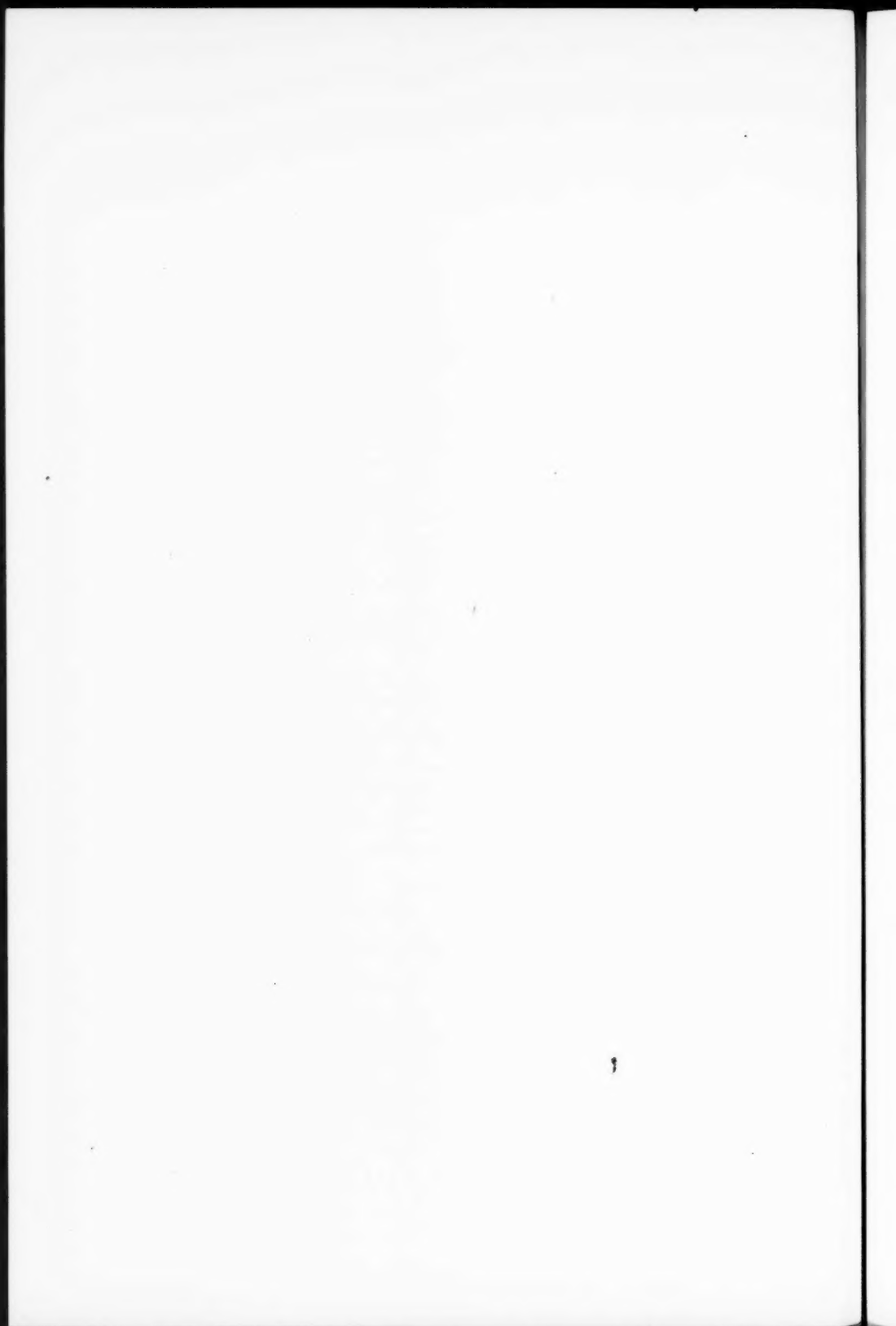
By S. E. DORE, M.D.

PATIENT states that she has had the eruption forty-one years, and was previously under the care of Mr. William Anderson and Dr. Stainer, at St. Thomas's Hospital. During this period she has had fresh outbreaks from time to time, the last one being about a year ago. The eruption consists of pink or crimson papules, mixed with excoriations and scars, the lesions having a linear arrangement running parallel to the long axis of the limb. There are also some larger excoriated areas covered with crusts evidently due to scratching. The anterior surfaces of both legs from the knees to the ankles are chiefly affected, but there are some papules on the dorsal surfaces of the feet and also on the right thigh above the knee where the lesions are also distributed in parallel lines. The fact that the patient is alcoholic no doubt partly accounts for the large number of excoriations and scars. The long duration does not necessarily exclude lichen planus and is no doubt accounted for by a large number of successive attacks or exacerbations of the eruption. I have recently seen a case in which a patient of 80 years of age has had more than twenty attacks of lichen planus extending over sixty years. I think the case is one of lichen planus rather than of linear nævus, a diagnosis which has also been made.

Case of Peculiar Scarring following Comedo.

By S. E. DORE, M.D.

PATIENT, a girl, aged 19, presents numerous small deep scars scattered sparsely over the nose and cheeks, of varying size and depth, some of them being triangular or irregular in shape. There are also a few comedones, and the scars appear to be the result of atrophy round a comedo without any intermediate stage of inflammation or suppuration. Patient has been under observation for some years and no papules or pustules have ever been seen. On the right side of the neck there is a large irregular scar said to have been the result of an abscess. The patient suffers from a mild but well marked degree of ichthyosis which may have influenced the scarring and there is also well marked scaliness of the scalp and oily seborrhœa of the face. The scarring is not of the close, pitted, cribriform variety described by French and American authors.



Section of Dermatology.¹

President — Dr. ARTHUR WHITFIELD.

Erythema Figuratum Perstans.

By H. W. BARBER, M.B.

PATIENT, a female, aged 38. The eruption, which consists of ringed erythematous patches, first appeared sixteen years ago around the right axilla. A few years later, similar patches appeared near the groins and on the lower abdomen, and during the past two years behind the knees. As a child she had repeated attacks of tonsillitis, with quinsies, and her tonsils are scarred and septic.

The case corresponds to the one which was originally reported by Dr. Colcott Fox in the "International Atlas of Rare Skin Diseases," under the title of "Erythema Gyrate Perstans," and similar cases have been described by Wende and Mook.

Atrophic Condition of Skin following Treatment of Nævus.

By E. G. GRAHAM LITTLE, M.D.

THE patient is a lady, aged 29. More than twenty years ago a nœvus on her shoulder was treated with some acid which was said to be acetic. The nœvus was the size of the end of a little finger, and was quite obliterated by the treatment, leaving a scar. From that focus has spread this atrophic condition of the skin for several years, and the process is still going on, causing her discomfort and trouble. At the present time there is a patch of dead white atrophic skin spreading from the summit of the shoulder, the site of the original scar, across the left breast, in an area roughly of the size and shape of the palm of a man's hand. There does not seem to be any perceptible sclerodermic tissue there, but the diagnosis which occurred to me was scleroderma. There seems to have been no redness nor ulcerative condition.

Case of Erythrodermia with Lymphocytosis.

By J. H. SEQUEIRA, M.D., and P. N. PANTON, M.B.

THE patient, a single man, aged 40, by occupation a groom-gardener, was admitted to the London Hospital on May 3, 1921, suffering from generalized erythrodermia of two years' duration. He is shown on account of the exact resemblance to a case shown by Dr. Sequeira before the Section in 1915² and again in 1919.³ The condition is one of general erythrodermia with a remarkable blood picture. The colour of the skin and its characters are identical with those of the previous patient, and the characteristic features of the blood are the same in both instances. The present patient is apparently in good health. The previous patient was watched for four years, and ultimately died—unfortunately out of hospital. This condition is quite distinct from mycosis fungoides, in which disease there are no such characteristic changes in the

¹ At a meeting of the Section, held June 16, 1921.

² *Brit. Journ. Derm.*, 1915, xxvi, p. 417.

³ *Ibid.*, 1919, xxxi, p. 148.

blood as in this variety of erythrodermia. Moreover, the previous patient was watched for four years and no tumours developed. There has been very little irritation of the skin. Dr. Turnbull has examined portions of the integument, which shows a chronic inflammatory condition.

Dr. PANTON said that an interesting feature of this case was the peculiar character of the blood change present. Identical blood changes had been present in a similar case examined by him in 1919. The main points of the blood examination in both cases were a moderate leucocytosis ranging from 15,000 to 30,000 leucocytes per cubic millimetre and a great increase in the lymphocytes, the relative proportions of the lymphocytes varying from 60 to 75 per cent., the type of lymphocyte being small. The red cells and hæmoglobin were practically unaffected. It was almost justifiable to describe these blood changes as peculiar to this disease. The changes differed from chronic lymphatic leukaemia in the moderate degree of leucocytosis and in the percentage of lymphocytes. In lymphatic leukaemia the total leucocyte count varied from 60,000 to 200,000, and the relative proportion of lymphocytes frequently exceeded 90 per cent. In both these cases the blood had been examined over a considerable period of time, and on no occasion had the blood varied to any appreciable degree. A similar relative lymphocytosis was, of course, present in many conditions, but was invariably associated with a leucopenia. These blood changes being identical in the only two instances of the disease which he had met with and being entirely absent from all their cases of mycosis fungoides strongly suggested that erythrodermia was a condition *per se*, and could be differentiated from the premycotic stage of mycosis fungoides by an examination of the blood. Skin infiltrations were known to occur in leukaemia. In his experience such infiltrations were extremely rare and remarkably so considering that almost every other organ in the body showed leukæmic infiltration. When they did occur they were merely minor incidents in a disease readily recognized by blood examination. There was one other and extremely rare condition of the skin associated with definite blood disease. In a case under the care of Dr. Sequeira, the patient, an Englishman, had become so dark as to be reasonably described as a black man. His blood had shown the changes typical of pernicious anæmia, and it had been evident that the colour of his skin was due to hæmolysis taking place in the skin instead of in the internal viscera. He (Dr. Pantón) had never before or since seen or heard of any case quite similar to that patient.

Keratodermia Blenorrhagica.

By E. G. GRAHAM LITTLE, M.D.

PATIENT, a male, aged 45, has been under Sir William Willcox's care at St. Mary's Hospital, for three months. He appears to have had gonorrhœal urethritis twenty years ago, and in the interval he has had several attacks of arthritis. More recently he has developed a characteristic horny medallion-like growth on the dorsal surface of the feet, and has the extreme cachexia which accompanies blenorrhagic urethritis. Sir William Willcox is inclined to ascribe it not to the gonorrhœal infection, but to a streptococcic condition. The skin lesions, however, are quite definitely of the type which has been described as keratodermia blenorrhagica. The difficulty is the long duration and the apparent immunity from urethritis. Still, that long duration is not entirely without precedent; Dr. Winkelried Williams has shown a case in which the urethritis occurred at least thirteen years before the development of the skin condition. It seems to be almost the rule that the skin condition should develop a long time after the cessation of the urethritis; in a case I saw at St. George's Hospital the interval was also a long one. Whether the name keratodermia blenorrhagica is a proper one, i.e., whether it is a gonorrhœal condition, is still a matter of dispute. The effect of gonorrhœal vaccines in these cases has, however, been surprisingly good.

Hyperkeratosis Blenorragica.

By F. CARMINOW DOBLE.

THE patient, a male, aged 29, first had gonorrhœa in 1917. His treatment consisted of irrigations of potassium permanganate, prostatic massage and sounds. He has had no vaccine treatment. There were no complications. On April 25 his right ankle became swollen and inflamed and very painful. In a week this swelling went down, but he then developed pain in the right hip, left shoulder and cervical vertebræ; later the knees became swollen. Three weeks after admission to hospital, he noticed a "pimple" on his right big toe, which turned into a hard corn. He picked this off but another grew in its place. Corns then appeared on both feet.

A slight urethral discharge was observed on May 18, but no gonococci were found. He came under my care on June 2, when I found gonococci in the urethral discharge, urine and prostatic fluid. His Wassermann reaction was negative but the complement deviation to gonorrhœa was + + +. I found his prostate normal in size, but his right seminal vesicle large and hard. He had a well marked hyperkeratosis on the soles of his feet and toes, and several patches like broken blisters, scattered about his ankles.

Professor Chauffard considers this skin condition to be due to cachexia produced by the virulence of the gonotoxin, which leads to trophic disturbances. In most of the cases I have seen, although there has always been a joint complication, the patient does not appear to have had a particularly severe attack. I have found that intramuscular injections of blood serum or "914," have a remarkably good effect.

DISCUSSION.

Dr. H. G. ADAMSON said the interesting point about these cases of so-called gonorrhœal hyperkeratosis was their possible relationship to psoriasis. One often saw cases of severe psoriasis and rheumatoid arthritis with heaped-up conical lesions on the soles and around the nails, which were indistinguishable from cases of gonorrhœal hyperkeratosis. Also, in many cases of gonorrhœal hyperkeratosis there had been a history of a psoriasiform eruption on the trunk. A further point was that the histology was the same. These hyperkeratotic lumps which occurred on soles and palms were not really hyperkeratosis, but parakeratosis. If the crust was removed one came upon a smooth surface, as in psoriasis. It was sometimes difficult to say whether a case was gonorrhœal keratosis or psoriasis. Eighteen months ago he had, in hospital, a typical case of gonorrhœal hyperkeratosis, with huge cone-shaped lesions on the palms and soles and nails, and with balanitis; there was a psoriasiform eruption on the trunk, but no gonorrhœa, though there was a history of gonorrhœa fifteen years before. In that case it was difficult to say whether it was gonorrhœal hyperkeratosis or psoriasis. The patient now shown had an eruption on the scalp, which was called seborrhœa, but might very well be psoriasis; it was a sharply demarcated scaly patch.

Dr. A. ALLPORT said that seven of these cases had been under his care at Rochester Row. In every case there had been gonorrhœa and arthritis, in other words, systemic gonorrhœa, and he viewed the skin lesions as a trophic change due to gonorrhœal poisoning. In the early cases, every kind of local application had been tried after removing the crusts, but without effect. In some of the cases he had treated the joint condition by electrolysis, with salicylate of soda, and also with potassium iodide, but the skin lesions about the joints so treated had not been benefited. One man, at Rochester Row more than a year, had become steadily worse, and had appeared to be dying of toxæmia. Two doses of intramine had been given to him, and he had improved considerably but had afterwards relapsed. The doses were only 1.5 c.c., and should

probably have been larger. When the man had appeared to be at the point of death, Dr. Allport, at Colonel Harrison's suggestion, gave neo-kharsivan, 0.2 grm., intramuscularly, dissolved in human serum. Just before the first injection the patient had been in a state of low, restless delirium, with a rapid, feeble pulse, and extreme emaciation. His legs and arms had been encased in keratoderma and his head, face and trunk had had many patches. Next day the man had been obviously better, and subsequently he had four more injections, the effect of which had been extraordinarily good. Within three months he had been fit and well except for the ankylosis of his joints. In a later case, however, Dr. Allport had tried the same treatment without benefit. He was not able to say what was the reason of the beneficial effects of the treatment in the first case, as the Wassermann reaction had been negative and there had been no suggestion of syphilis. In another case he had tried T.A.B. vaccine intravenously, giving 200 millions twice. The man, who had had bad gonorrhœal rheumatism at the time, had improved rapidly.

Dr. J. H. SEQUEIRA could not agree that this variety of keratoderma was not peculiar to gonococcal infection. The eruption was characteristic, and had been recognized in the French clinics since 1893 when it was first described by Vidal.¹ He (Dr. Sequeira) had shown the first case recognized in this country in 1910.² He recalled a case of Jacquet's,³ in which the patient had six attacks of gonorrhœa. In the first there was urethritis only, in the second and third there were urethritis and arthritis, and in the fourth, fifth and sixth attacks, urethritis, arthritis and keratoderma.

? *Lichen Variegatus*.

By E. G. GRAHAM LITTLE, M.D., and Sir WILLIAM WILLCOX, K.C.I.E., C.B., C.M.G., M.D.

THE patient, a female, aged 24, has an eruption which has been ascribed to exposure to chemical substances in a munition factory where she worked two years ago. After leaving that factory she developed a yellow colour, and some part of the rash followed. The unusual feature is the curious lichenoid follicular eruption on the back, and especially on the thighs. There was an appearance of a very remarkable degree of *striae cutis distensæ*. We do not think her munition work has anything to do with the appearance of the eruption, but are not prepared to say what the eruption is. It is not of very long duration, not more than two years, and she is getting well.

The PRESIDENT said he was more strongly impressed by the very solid fatty œdema in the case than by the skin eruption. The latter was an excess of a fairly common condition in girls of about this age, usually limited to the extensor surfaces of the upper arm, and nearly always occurring in very fat girls. He did not think it was seen in men even when fat. He regarded it as a stagnatory folliculitis of the arms and trunk. The patient said she grew fat quickly and became much darker than before; whether she was confusing that with discoloration caused by her munition work he could not be clear. He regarded this as an endocrine condition, and thought the eruption was in some degrees secondary to the fatty stagnation and partly of endocrine origin. Either the pituitary body or the ovary might be at fault, and he suggested that the patient's condition should be investigated from that point of view. He felt certain this case was not one of lichen variegatus.

¹ *Soc. de Dermatologie*, January 12, 1893; *Annales de Derm. et Syph.*, 1893, 3me sér., iv, p. 3.

² *Brit. Journ. Derm.*, 1910, xxii, p. 139.

³ *Bull. et Mém. Soc. Méd. des Hôp. de Paris*, January, 1897, 3 s. xiv, p. 93.

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VOLUME THE FOURTEENTH

SESSION 1920-21

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DISCUSSION ON RADIO-THERAPY.¹

Some Physical Considerations in Radio-therapy.

By SIDNEY RUSS, D.Sc., and L. H. CLARK, B.Sc.

DEEP THERAPY.

PORTER [1] has shown that, in order to apply a maximum intensity of X-rays at a depth " d " of tissue, that particular radiation should be selected which is diminished to one-half of its intensity by this thickness. This presupposes the same intensity of radiation at the surface in all cases, which need not be the case in practice.

We propose approaching the problem of deep therapy from a different physical aspect. We start with the postulate that the desideratum in the irradiation of a tumour is that all parts of the tumour receive, as nearly as possible, the same amount of radiation, and further that, wherever possible, this amount should be a lethal dose for the tumour in question.

By a selection of typical examples, it will be seen to what extent these conditions are realizable in practice. Certain experimental facts relating to the problem of uniform irradiation will then be brought forward and their significance discussed. In discussing the methods of irradiation of tumours we shall restrict ourselves to two examples.

TYPE CASE A.—TUMOUR EXTENSIVE AND DEEP-SEATED.

If irradiated by means of X-rays, the expression giving us the intensity (I_d) at the layer of tissue most remote from the surface is

$$I_d = I_o e^{-\lambda d} \left(\frac{x}{x+d} \right)^2.$$

Where I_o is the intensity at the surface of the tumour, d its depth below the surface, x the distance of the anode from the surface

¹ At a meeting of the Section, held November 19, 1920.

irradiated, and λ is the coefficient of absorption by the tissue of the rays used.

Method of Irradiation I.—We will take as the radiation conditions the use of a moderately hard bulb run at an alternative spark gap of about 15 cm. (100,000 volts) lightly screened, say, by 1 mm. of aluminium, the distance of the focal spot being 15 cm. from the surface. The thickness of tumour substance is taken as 8 cm. and situated 1 cm. below the surface. The radiation is not homogeneous, λ varying from

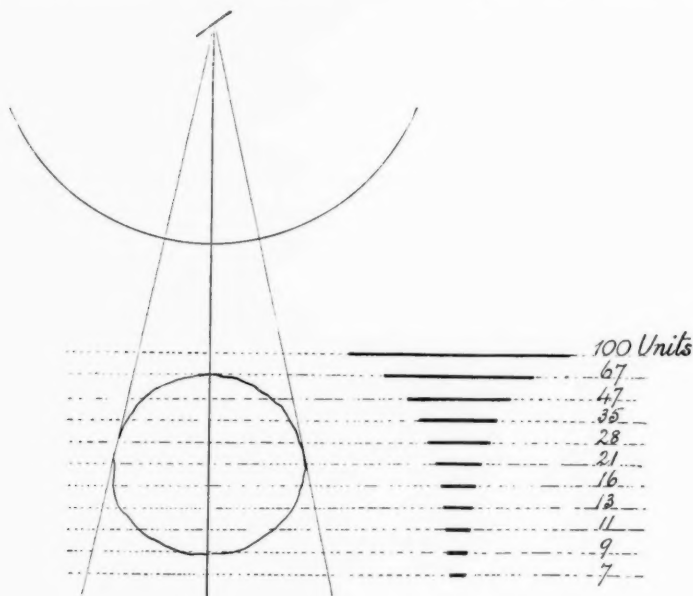


FIG. 1.

0.138 to 0.092 cm.⁻¹. Taking the surface intensity as 100 units, the thick lines in fig. 1 indicate the intensities at different depths throughout the tumour; it will be observed that a very wide departure from uniformity exists under such conditions.

Method of Irradiation II.—The clinical data are assumed the same, but the method of irradiation now proposed is the use of a very hard bulb, 32 cm. alternative spark gap (180,000 volts), the radiation screened by 10 mm. of aluminium, the distance of the focal spot being 30 cm. from the surface—the radiation is practically homogeneous with coefficient $\lambda = 0.085$ cm.⁻¹.

It will be seen that the approach to uniformity still leaves much to be desired, though the technical conditions, apart from an increase in x , are about the limit of what is realizable in many X-ray installations for deep therapy at the present day.

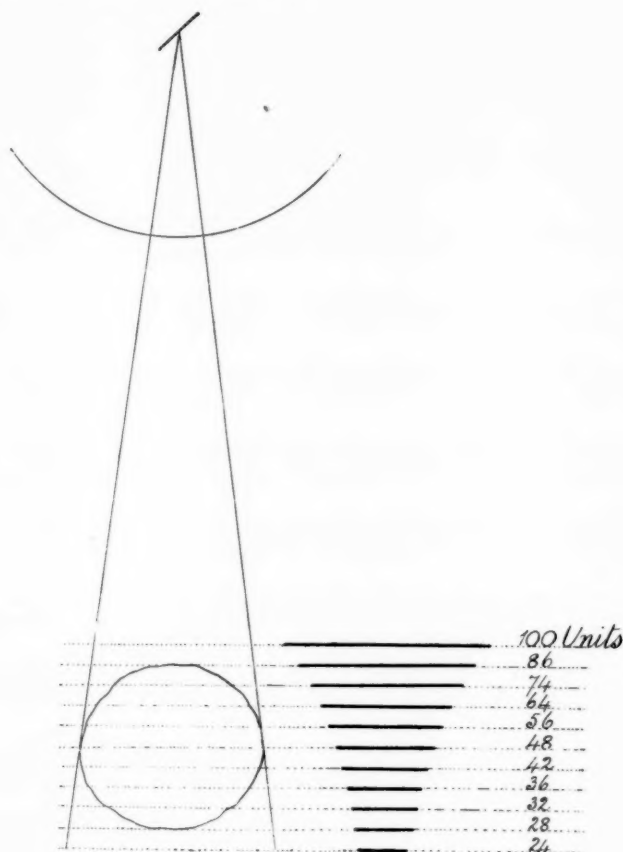


FIG. 2.

When we look for methods by which greater uniformity may be obtained, perhaps the first consideration is that, by the choice of various ports of entry through the skin, greater uniformity is secured and a great deal may be done in this way, but the irradiation of large areas of the normal tissues is thereby involved and there are reasons

for trying to restrict this as much as possible when trying to overcome a malignant growth in the body. It is therefore important to see how to reduce this fall of intensity through the tissues by other means. If we examine the algebraic expression, it can be seen that, in order to make the intensity I_d vary as little as possible from the surface intensity I_o , λ must be very small, i.e., very penetrating radiation must be used and the larger d is, the greater the difficulty of the problem; but x should be very much larger than d in order that the loss of intensity due to increased distance from the anode should be small. The factor $(\frac{x}{x+d})^2$ is only true if the anode of the tube is a small area—i.e., it

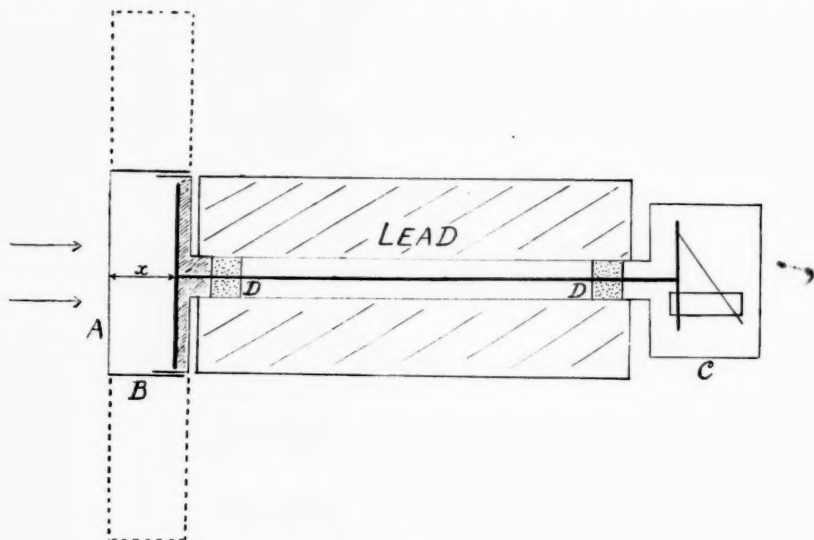


FIG. 3.

approximates to a point source of radiation. It seemed worth while to determine by experiment the fall of intensity with distance, using, not a point source, but discs of different diameters.

The measurements consisted in choosing radio-active sources of varying diameter, which were placed in turn at distances ranging between 15 cm. and 35 cm. from a gold leaf electroscope of special design, *vide* fig. 3. The principal feature of the latter was that the depth and size of the ionization chamber could be altered to suit the various clinical problems upon which it was decided that the measurements might bear. Figs. 4 and 5 represent graphically the results obtained.

In fig. 4 the lower graph (I) shows the fall of intensity with distance when a point source is used, whilst the upper one obtains for a radiating disc of 11.5 cm. diameter. In like manner the lowest curve of fig. 5 represents the fall of intensity with the distance between the source and the ionization chamber for a point source; the middle curve for a radiating disc of 2 cm. diameter and the upper for a disc of 4.4 cm. diameter. In each case it is seen that, as the size of the source increases,

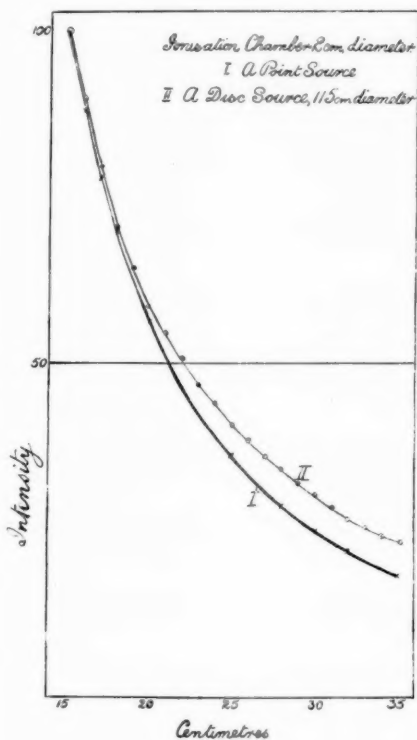


FIG. 4.

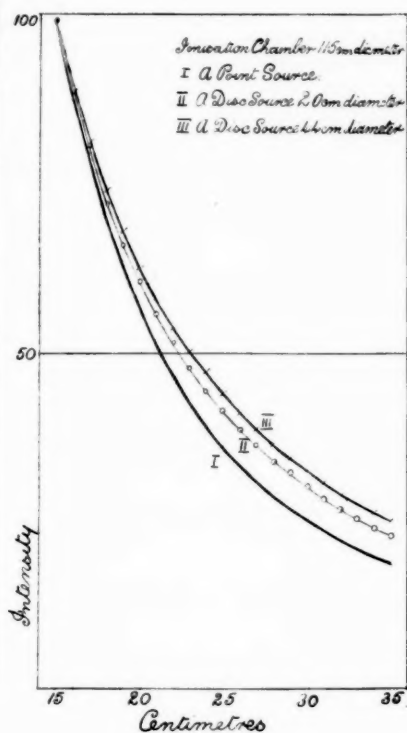


FIG. 5.

the fall of intensity with increase in distance from the ionization chamber becomes less rapid. One obtains a similar result from theory. Walsh [2] has shown that the expression—

$$\frac{[(R^2 + r^2 + a^2) - \sqrt{(R^2 + r^2 + a^2)^2 - 4r^2R^2}]}{2R^2}$$

represents the fraction of the whole downward radiation from a radiating disc of radius R , which is received by a parallel co-axial disc of radius r

and distance a . This expression was deduced on the assumption that the radiation in any direction from a disc of radius R is proportional to the cosine of the angle between that direction and the normal to the surface of the disc. Assuming that radium and emanation applicators radiate according to the cosine law it can be shown that, in order to produce the maximum intensity at given region, it is necessary to use a radiating source of the same area in juxtaposition. For a given distance apart, the greater the diameter of the radiating disc, the less is the fraction of its total radiation incident on the disc of radius r . Further, when the source and receiver are fairly close together, the variation of the amount of radiation received with the size of the source is considerably greater than when they are relatively far apart. These two points are well shown in fig. 6, where the ordinates represent the values which the above expression assumes for different values of R , the radius of the radiating disc.

The graphs I to V are for the cases in which the distances from the source to the receiver are $a = 0.1r, 0.5r, r, 2r, 3r$ respectively. It will be noted that, as the size of radiator increases in diameter from $R = 0.1r$ to $R = 5r$, the percentage flux received decreases in I, from 99 to 4 per cent.; in II, from 80 to 3.9 per cent.; in III, from 50 to 3.8 per cent.; in IV, from 20 to 3.4 per cent., and in V, from 10 to 2.9 per cent. A similar graph for $a = 30r$ gives a corresponding reduction from 0.115 to 0.108 per cent. Hence, as the distance between the source and the receiver becomes great relative to the radius of the latter, the size of the radiating disc becomes of less importance. It is to be noted that curve II of fig. 4 was obtained using an ionization chamber of 1 cm. radius, and that, when the distance between the source and the chamber was 30 cm.—i.e., $a = 30r$, the intensity, using a radiating disc of 5.75 cm. radius, has fallen to 30 per cent. of its value when 15 cm. separated them. However, in fig. 5, where the results were obtained using an ionization chamber of 5.75 cm. radius, a distance of 30 cm. between radiator and receiver is equivalent to $a = 5.22r$, and it is seen that the intensity has fallen to the same extent for a radiating disc of 1 cm. radius.

Considering any one of the curves of fig. 6, it is obvious that, for a particular distance between the source and the area to be treated, the maximum percentage of the total radiation received, and hence, since the area of the receiver remains constant, the maximum intensity at the receiver, are obtained by using as small a source as possible. On the other hand, the fall of the percentage radiation received as the distance increases is most rapid for a small source—e.g., $R = 0.1r$. This can be

seen in fig. 6 by stepping vertically down from one graph to the next and so making the distance between the source and the receiver, $a = 0.1r, 0.5r, r, 2r$, and $3r$. For a point source simply obeying the inverse square law, the fall with distance would be even greater. Therefore, if uniform irradiation is the desideratum for deep therapy, the small or point source is the worst possible to use for such.

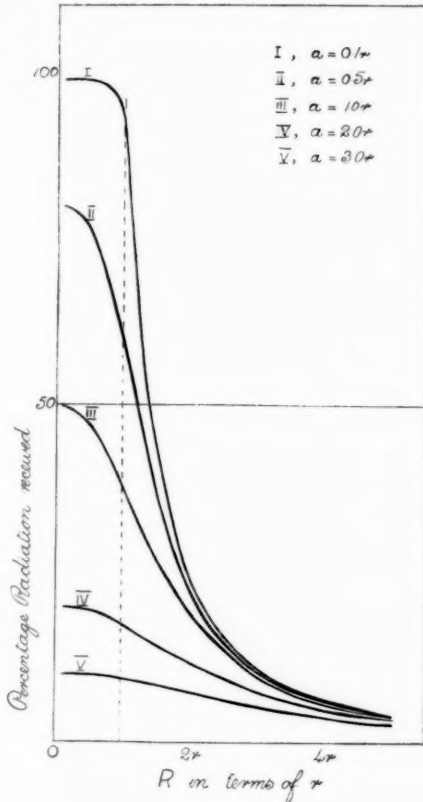


FIG. 6.

Theory and experiment suggest that an X-ray tube having a large radiating anode would be preferable to the focus tube in vogue for deep therapy. The large anode tube would give considerably more uniform irradiation through a given thickness of tissue, as the intensity would fall off less rapidly with distance than is possible with the focus tube.

However the constructional details necessary for the production of such a tube might make it impracticable.

By the aid of the foregoing data, we may now consider a second clinical example:—

TYPE CASE B.—TUMOUR LOCALIZED AND NEARLY SUPERFICIAL.

In this case we will assume that a surface application of a radium preparation is to be made, that the gamma rays would be employed and that the greatest depth at which it is desired to administer a lethal dose is 1 cm., and this over a circular area, 4 cm. diameter. We see, therefore, that there remains but one variable to consider and that is the radius of the radiating surface. We are assuming that the quantity of radium available is limited to some arbitrary quantity (say 100 mgr.); the questions before us are two-fold: (a) Over what area should the radium be spread in order to get the maximum intensity at a depth of 1 cm.; and (b) whether there are any contra-indications to the use of the optimum area designated under (a). From the given clinical condition $a = 0.5r$ ($a = 1$ cm., $r = 2$ cm.) and graph II, fig. 6, we can read off the percentage of the total radiation from the capsule actually received by the area of tissue 1 cm. below the surface.

Method of Irradiation I.—If the radium were spread over a circle of 1 cm. diameter, $79 - 5 = 74$ per cent. of the total downward radiation from the capsule would be received by the layer of tissue at 1 cm. depth, 5 per cent. being deducted for the absorption of the gamma rays by the supervening tissues.

Method of Irradiation II.—If the radium were spread over a circle of 4 cm. diameter, $61 - 5 = 56$ per cent. of the total, downward radiation from the capsule would be received by the layer in question. The method of irradiation (I) would probably be considered bad clinically for two reasons—first, the surface layer would be submitted to radiation about $1\frac{1}{4}$ times that at the depth 1 cm. and secondly the lack of uniformity of radiation over the large treated area would be very pronounced with a radiating disc of diameter 1 cm. These two considerations would probably more than counterbalance, in the opinion of a clinician, the slight reduction in the intensity of radiation over the layer in question when the radiating disc had its diameter increased to 4 cm. He would, in all probability, increase the time of exposure so as to compensate for this deficiency, at the same time ensuring a much more uniform irradiation of the tissue under treatment.

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The Radio-therapy of Superficial Structures.

By G. B. BATTEN, M.D.

I PROPOSE to discuss only the treatment of diseases of the skin and mucous membranes by X-rays, under the three following heads:—

(1) Treatment of skin appendages, especially hair; where cure is effected by producing defluvium, as in ringworm of the scalp and beard, favus, sycosis, impetigo and hirsuties.

(2) Treatment of skin and mucous membranes in diseases such as acne, psoriasis, furunculosis, chronic eczema, hyperidrosis, bromidrosis, alopecia, leucoderma, rhagides and non-malignant ulcerations.

(3) Treatment of lupus, lupus erythematosus, rodent ulcer, epithelioma, carcinomatous and other malignant new growths of the skin and mucous membranes and recurrent nodules after operations, especially of the breast.

As I have had a long and extensive experience of the first division, and as the exact and correct dosage to get epilation of the hair is up to the present the most convenient and practical physiological unit in X-ray treatment, I will now deal with it. In the latter part of 1902 I succeeded in causing the defluvium of the hair in a case of ringworm of the scalp, the consequent cure and subsequent regrowth of hair—I believe, the first case so cured, at any rate in Great Britain, and I think anywhere. In the treatment of ringworm by X-rays incorrect dosage is found out more quickly and with greater certainty, I believe, than in any other form of radio-therapy. In 1906 I devised a method, and in July, 1907, published a paper in the *Archives of the Röntgen Ray*, describing a method of overlapping the areas for dosage. Dr. Adamson and Dr. Critchley in this country and Kienböck in Vienna improved upon this and described the method now almost universally used, the 5 in., 5 area, open overlapping method for treatment of the whole scalp in a child affected with ringworm of the head. I may here say, that after eighteen years' personal experience, I believe the safe limits of exposure for epilation are between 10 and 12 per cent. on each side of the exact correct dosage.

[Dr. Batten then described his method of working at half-time distances.]

By this method with a tube changing the pastille in six minutes at full distance, one reduces whole exposures for one head from thirty to eighteen minutes, a distinct gain to patient, tube and operator. With a slower tube the saving of time is proportionately greater.

By experience I have found the following practical points to be important:—

- (1) The hair should be cut to about $\frac{3}{16}$ in. long, but not shaved.
- (2) The distance apart of the centres of the five areas is better at $4\frac{1}{2}$ in. rather than 5 in., but not less than $4\frac{1}{2}$ in.
- (3) The anticathode must be centred carefully above each area and at right angles to head at each of these points.
- (4) Great care and accuracy must be used in measuring and maintaining the distances of pastille and of head from anticathode—i.e., in placing the anticathode of tube at correct distance from ends of the rods, and the tube itself must not be tilted within its shield.
- (5) The aperture in the shield should be at least $4\frac{1}{2}$ in., or better, 5 in. in diameter.
- (6) In the lateral portions the ears must be covered with opaque rubber caps.
- (7) When the half-time distance is used a piece of bandage is kept taut by elastic across aperture of shield, and head is placed against this without indenting it, except as hereafter explained.
- (8) The vacuum of tube must be sufficiently high; if a gas tube, the alternate spark gap between points should not be less than $4\frac{1}{2}$ in. and is better at 6 or 7 in.

(9) Where the head is curved much, as is usually the case, especially at the vertex, then at the half-time distance a little more than half the dose should be given—i.e., up to, but not exceeding, six-tenths of the whole time, or number of the interruptions; for instance, if six minutes, or 6,000 interruptions is a dose at full distance, and three minutes or 3,000 interruptions at half-time distance, then in curved areas, up to, but not exceeding, three and a half minutes or 3,600 interruptions may be given with advantage; or if preferred the nearest portion of curved part may be placed a little nearer the anticathode by arranging the length of distance rods, or by indenting the bandage about $\frac{1}{4}$ in., and giving exactly half the dose, or half the number of interruptions, as at full distance.

Here is a table giving correct distances from head to anticathode with three sized tubes, and for full and half time distances (*see next page*).

Since we have had water-cooled tungsten target tubes and Coolidge tubes, and where these are available and we can get three or more milliamperes through them for long periods, it is better to expose all the areas of a head for ringworm at the full distance. With a high

tube, 6 to 8 in. alternate spark gap, and with 3 ma., one can change pastille to tint B in three minutes or less, and therefore the whole head can be done in fifteen to eighteen minutes, which is fast enough. When working as with a Coolidge tube it is inadvisable in the treatment of ringworm to change the pastille under two and a half minutes, for if the pastille dose is made less than this, an error of only fifteen seconds equals the safe percentage margin. I now usually put a filter of one-seventh of a millimetre of aluminium between the tube and the head and in front of the pastille. I always advise the use of some non-irritating antiseptic, such as methylated spirit applied with a brush once a day over the whole scalp and continued until the hair has grown again. The following is my favourite lotion: resorcin, 1 per cent.; æther meth., 25 per cent.; methylated spirit, 74 per cent. This can be scented if desired, but methylated spirit alone does quite well. I advise epilation to be done through a layer of spirit applied with a brush.

Size of tube	Distance between anticathode and outside of bulb	Distance of pastille	Distances between focal point of anticathode and the head		
			Full time	Half time	Half time for curved parts
5 in.	2.5 in.	3.0 in.	6 in.	4.25 in.	Not less than 4 in.
6 in.	3.0 „	3.5 „	7 „	4.95 „	4.52 in.
7 in.	3.5 „	4.0 „	8 „	5.66 „	5.25 in.

In the second group, I believe we want to aim at a dosage that will cause stimulation of the healthy cells and retardation of diseased cells or of bacterial cells. For all this group I use much the same dosage and procedure. I use from $\frac{1}{2}$ to 1 mm. of aluminium as a filter and give half a pastille dose measured on skin side of filter once a week, for from three to six doses and then wait. Usually this will have cured most cases of acne, eczema, furunculosis, rhagides and superficial ulcerations. I think that the pastille holder should be inserted radially to the tube, and be made so that discs of aluminium can be inserted in front of the pastille.

In the third division of skin complaints, we require a dosage that tends to destroy diseased cells and yet causes stimulation of healthy cells. This aim can be effected by using larger doses of hard rays through thicker filters. For lupus and rodent ulcer, I use from

$\frac{1}{2}$ to 1 mm. of aluminium, and for the rest from 1 to 3 mm. and give two-thirds of a pastille dose measured on skin side of the filter; the thickness of the filter, the number and frequency of exposures depends on the thickness or depth of the invading disease. I usually treat all the epitheliomata and carcinomata of the skin once or twice a week until very definite signs of their disappearance are manifest. If extensive areas are involved, I use the open overlapping area method as in ringworm. In this group the method described of bringing the skin nearer the anticathode is very useful, as it enables one to give a sufficient dose in a much shorter time. One must always remember to measure the dose according to rule of square of distances—i.e., if full two-thirds of a pastille dose takes eight minutes at 7 in., it will only take four minutes at 4.95 or 5 in. In these cases I think much time is wasted by placing the patient, as is so often done, at 10 in. or farther from anticathode.

It would be better if the shields for X-ray treatment tubes, except for the filter, contained either no metal or much less metal on the patient's side of the shield; even the tube holding the pastille holder is better made of non-conducting material, such as fibre. This absence of metal enables tube and shield to be brought with safety much nearer the patient.

I have recently been in correspondence with Dr. Coolidge with the view of getting him to make a small-sized therapeutic tube, rather of his dental type, which, with its glass cover, possibly filled with insulating oil, could be placed safely quite close to the patient's skin. He replied in quite an encouraging way, and said that Drs. Bordier and Bécère and others in Paris even wanted a Coolidge tube to insert into cavities of the body.

Deep Radio-therapy.

By N. S. FINZI, M.B.

As we are limited by the amount of rays the skin will tolerate, we aim at getting a larger dose to the part treated than to the surface. This is only possible of attainment in parts which lie at some depth, so that a cross-fire of radiation can be used. The other essentials are a very penetrating radiation and several ports of entry. Attempts have also been made to increase the radiation received by a tumour by injecting substances into it which will give off secondary radiations.

Unfortunately these secondary radiations have little penetrating power and the substances injected screen off a quantity of direct radiation. The radiation received by a deep tumour has also been increased by the application of a radium tube to the interior of the tumour: this is a sound and rational method and is used as soon as possible after the first X-ray application.

To obtain penetrating rays a high voltage must be used on the tube, which means that the tube must be hard. I use at present a 10 or 11 in. alternate gap, but if I could get the apparatus to do it, I should use a higher voltage still. In order to increase still further the proportion of hard rays we use a metal filter which diminishes the soft rays. An ideal filter would completely cut off all rays below a required wave-length, but such is not known and all filters let through a proportion of soft rays; further, they all let through more soft rays when a soft tube is used than with a hard tube. Aluminium, however, has been found to be, on the whole, the most suitable substance to use for filtration, as it cuts off a larger proportion of soft rays.

The rays which reach the patient must be measured—i.e., the rays which have passed the filter; tables and calculations are useless. An instrument which measures the dose received by the growth would be ideal, and I believe that this is being used in Germany.

The penetrating rays enable one to give a bigger proportion of rays at a depth compared to that received by the surface, and they also enable one considerably to increase the surface dose as measured by any ordinary method. Further I hold the opinion that penetrating rays have a greater selective action than soft rays, so that they should also be used for many quite superficial conditions such as rodent ulcers.

There are two systems. In one a few large ports of entry are used and the tube is displaced to a considerable distance from the skin in order to diminish the amount of falling off of the radiation as a result of the inverse square law. If the tube were an infinite distance the radiations would be parallel and the only factor causing diminution of them would be the absorption by the tissues. In the other method, introduced by the Freiburg clinic, a large number of small ports of entry with the tube very close to the skin is used, in order to counteract, by a large number of overlapping rays, the disadvantage of the proximity of the tube. This method, however, is very wasteful, takes much time and the results are at any rate no better than by the other: it has also been abandoned by its originators, Gauss and Lembcke.

The next question is that of maximal doses given in one sitting

with the minimal interval before the next dose (three weeks), or splitting the dose up and giving small doses at frequent intervals. In the first place it is necessary to give sufficient radiation. I have at present under my care two cases in which failure can be traced to doses which were too small. Maximal doses have caused in both of these much improvement and great relief. I am firmly convinced that in malignant disease it is better to give the maximum amount in one dose, spread over two or three days if essential, in order to prevent radiation sickness, than to give the maximum amount possible every week or every fortnight, though in the latter case it is possible to give a larger total of actual radiation. In tuberculosis it does not matter so much which method is used as either gives good results and as a rule smaller doses are needed than for malignant disease. If one can give $7\frac{1}{2}$ H every three weeks, then $5\frac{1}{2}$ to 6 H can be given once a fortnight to the same skin area, or 3 to $3\frac{1}{2}$ H weekly. Another essential to success in the treatment of malignant disease is to treat the whole of the gland area draining the affected part as well as the surrounding lymphatics. The amount of radiation that can be given is often limited by the general effects which, when the area treated is very large, may prevent efficient irradiation.

It is possible that when only a small area is treated the effect on the blood may be the same as if the whole body were exposed to a much weaker radiation in order to raise the patient's resistance to the tumour. At present however we can only obtain good results by direct action and not by having the X-ray tube on the ceiling.

Prolonged treatment causes changes in the skin. A case of malignant disease which has received sufficient irradiation will always leave the skin area which is under treatment more or less pigmented after the first few weeks and no case can be regarded as receiving maximal doses unless such pigmentation occurs. It varies, however, greatly in amount in different individuals. Some years after the treatment is started, and often a considerable time after its conclusion, telangiectases form in the area treated and they cannot be prevented. One after-effect which occurs occasionally, though fortunately in a very small proportion of cases, is the late X-ray inflammation or ulceration, due in my opinion to a bacterial infection of tissues already damaged by the X-rays. The only treatment for this condition which does any good is to keep the part quite dry and give autogenous vaccines. It is more likely to occur if there has been marked erythema during the treatment. The only way to prevent telangiectases in non-malignant

cases is to give submaximal doses and not continue the treatment too long.

Radiation sickness occurs in a large proportion of cases and if a large blood-containing area receives a considerable dose it is to be expected. The only way to prevent it is to space out the treatment over several days.

I use a Coolidge tube working with a 10 to 11 in. alternate spark gap and a $3\frac{1}{2}$ to 5 mm. aluminium filter, but would prefer to use a still thicker filter.

Great care must be taken that the pastille is correctly placed in the tube-shield. Many of these are faultily constructed so that they do not give the doses which they are supposed to give. Care must also be taken in the selection of pastilles: the comparison tint in any one batch can be by no means relied on. The best way is to get a batch of pastilles which one knows to be correct to a certain comparison tint and then buy a large quantity of them. They can be used many times if brought back to the original colour by light.

I again appeal for bigger doses of a harder and more homogeneous irradiation. It is in this direction that progress will be made.

Dr. AGNES SAVILL

referred to the early days of ringworm treatment, when Sabouraud's pastille was first introduced in 1905. She had always regarded the pastille as reliable when obtained from France, and when used placed on the skin—Hampson's method—both for superficial and for deep therapy. She had had no dermatitis in skin therapy till this year, when, with a new apparatus a series of burns occurred in succession. The only change in method had been the use of a stronger milliamperage—3 to $3\frac{1}{2}$ ma. On reverting to 1 to 2 ma. with the new apparatus the dermatitis ceased to appear. Evidently the conclusion could be drawn that the pastille was not reliable when there was a high degree of soft rays. Split doses, half a pastille, without filtration, once a fortnight, usually cured psoriasis and chronic eczema. For superficial rodent ulcers she preferred a full pastille dose once a month for three or four doses, half the dose filtered through $\frac{1}{2}$ mm. aluminium.

Dr. J. METCALFE

said that many of the superficial forms of diseases of the skin, such as eczemas, psoriasis and tubercular lesions, were as a rule readily amenable to X-ray treatment. Sometimes tubercular conditions and

lupus vulgaris did not improve. Finsen light treatment sometimes acted when the X-rays failed, and vice versa. But some cases of lupus responded neither to one nor the other. He had found that these cases often had a very low opsonic index. The injection of tuberculin and consequent raising of the index had allowed the local treatment to become very effective. Dr. Finzi's views on the treatment of deep seated lesions were in consonance with those held by the speaker. What was required was that full pastille doses with the pastille on the outer side of the filter should be given: a tube with a long spark gap equivalent and consequently giving off very hard rays, and a thick aluminium filter. Correct filtration was fundamental in the treatment of all deep seated lesions.

(The Discussion was adjourned to the next Meeting.)

Section of Electro-Therapeutics.

President—Dr. S. GILBERT SCOTT.

ADJOURNED DISCUSSION ON RADIO-THERAPY.

Dr. REGINALD MORTON

said that the present position of X-ray therapeutics in this country, at least in so far as it applied to deep therapy and the treatment of malignant disease, could not be described as entirely satisfactory. It was true they had made great progress, and it was in the experience of all of them who practised X-ray therapy more or less extensively that they achieved occasional successes that might be described as sensational. Unfortunately these were the exceptions, and they could seldom, if ever, undertake a new case with any confidence as to the ultimate result. The reasons for this unsatisfactory state of affairs were not far to seek. Probably the most serious obstacle to success was the law of inverse squares which prevented the deeper parts receiving more than a fraction of the skin dose. The "cross fire" method overcame this to some extent but not entirely. Serious limitations were imposed upon them by their equipment. Tubes were unstable and rapidly perished if worked at a high tension, yet it was only at very high tensions that they could hope to get the intense homogeneous radiation they required. Coils and transformers had an unfortunate way of breaking down when pushed to these high tensions, as many of them knew to their cost. The Coolidge tube had been of great service and had improved their position considerably. But even it was not beyond criticism as he would show presently.

To come to underlying principles, it was agreed among radiologists that cancerous and other abnormal cells had a lower resisting power to the influence of radiations than possessed by normal cells, and that if the diseased cells received what they might call a unit skin dose (the maximum amount normal skin would stand without serious injury) they would be destroyed more or less completely. Formerly he used to attribute his failures to differences in susceptibility on the part of some malignant cells the nature of which was outside their knowledge.

¹ At a meeting of the Section, held December 17, 1920.

During recent years he had abandoned that view for the one that insufficient radiation was the real cause. The use of larger doses with harder tubes and thicker filters and the exposure of a large area around the obvious growth gave decidedly better results, though still a very long way short of perfection.

Quite recently his attention had been drawn to a system of X-ray therapy evolved by Dr. Hermann Wintz, professor of gynecology at the University at Erlangen, Bavaria. The apparatus worked all day for at least eight hours at the normal sparking distance of 40 cm.—16 in.—and no doubt certain members of the Section would be glad to hear that such apparatus was in existence. The generating apparatus was a specially designed coil and mercury break. The normal primary current was approximately 4 amp. For all treatment the secondary current was kept constant at 2 to 2.2 ma., with the tube resistance equivalent to the normal spark gap of 16 in. Contrary to expectation the Coolidge tube did not give the best results, as it had been found to give a less homogeneous radiation than a specially designed "gas" tube, and to require about 30 per cent. longer time to get the same result. The tubes were about 30 in. long between terminals, the bulbs about 8 in. in diameter, and provided with an Osmo regulator. A small Bunsen burner was fixed close to the regulator, and this was fed with gas automatically through a most ingenious relay controlled by the secondary current. The anticathode was water-cooled, the water being kept boiling continuously and renewed as required. The seasoning of a new tube was a process requiring special care until it attained constancy, and must always be worked on the same apparatus. When seasoned its radiation value was ascertained by the iontoquantimeter, an instrument possessing a high degree of sensitiveness and accuracy. Observation with the iontoquantimeter and the application of certain formulæ enabled the radiation value of the tube to be expressed in figures, which formed one of the factors necessary in calculating the dosage for any particular case. Every tube was recalibrated after each twenty hours' use. In addition to the devices for securing constancy there was a special form of voltmeter connected across the terminals of the primary coil. This was called a sclerometer, and under normal conditions read between 100 and 110.

It would thus be seen that one of the fundamental principles of the system was the use of a radiation as nearly constant as was humanly possible at present. Even the speed of the interrupter was kept constant that there might be no variation from this cause.

In estimating dosage there were other factors to be considered. First there was the law of diminishing intensity as the square of the distance, and they had also to consider the value of the absorption of the intervening tissues when treating deeply-seated parts. The ionizing chamber of the iontoquantimeter was quite small, and one had been specially made for insertion into the vagina. By this means Professor Wintz was able to determine exactly the amount of radiation actually received at the os uteri under a given set of conditions.

Working with such an apparatus and a standard tube, passing 2 to 2.2 ma. at a 40 cm. spark gap, primary current 4 amp., sclerometer 100 to 110, the unit skin dose (U.S.D.) would be given in approximately thirty-five minutes at the normal distance of 23 cm. The time might vary on either side according to tube efficiency. A filter was of course interposed between the tube and the skin. With tubes of such extreme hardness the filter had to be very thick or else made of a metal having a higher atomic weight than aluminium. The filter employed was made of zinc 0.5 mm. thick; this was equivalent to about 12 mm. of aluminium. Working under these conditions it was found from absorption tests that the resultant beam of X-rays was almost completely homogeneous, and of a character such as they had never had before. In choosing a filter it was not good enough to buy sheet zinc from the metal merchant. It must be absolutely pure zinc and of a perfectly even thickness throughout. The filters were incorporated in the tube-holder, and every one had to pass a rigid test before it was used. As mounted in the holder they were insulated and protected from mechanical injury.

The technique of the system differed very materially from what was customary in this country at least. The tube-holder was so proportioned that when the applicator was fitted and brought in contact with the skin the latter was 23 cm. from the anticathode. This was the normal working distance for deeply-seated parts, and as already stated the U.S.D. would be given in approximately thirty-five minutes. There would be reddening of the skin in from four to eight days, and tanning in from three to four weeks. Taking this U.S.D. as 100 it was found that a cancer cell required 110 per cent. of this to ensure its destruction. Sarcoma required only 80 per cent.; tuberculous glands and joints recovered rapidly after about 50 per cent. A 90 per cent. dose applied to a cancerous growth paralysed it, so to speak, and even caused it to shrink, but it was not with certainty destroyed, and might recur. A 40 per cent. dose acted as a strong stimulant,

and caused it to increase rapidly. That was where the serious danger lay in attempting to treat cancerous growths with anything less than the full cancer dose, which must be given at one sitting.

How did this work out in practice? — a case of cancer of the cervix uteri, for instance, without local extension. It was found that when an application of the U.S.D. was made over the symphysis only 18 per cent. of this reached the cervix, dispersion and absorption accounting for the loss of 82 per cent. Consequently two more were given in front, one on either side of the middle line; the patient was then turned over, and three similar applications made from behind, all being accurately directed towards the cervix. They had now given six doses, each 18 per cent. of the U.S.D., and in the case of a thin patient this total of 108 per cent. was sufficient. If the patient was stout a seventh application was made with the applicator against the vulva and directed towards the cervix. All of this must be given at the one sitting. In the great majority of such cases no trace of cancer could be detected after healing had taken place, and test excisions were negative under the microscope.

In a more advanced case with involvement of the parametrium, the first sitting was exactly the same as the above, the whole being directed towards the destruction of the primary growth. Six weeks later one parametrium was attacked — the one most seriously infiltrated being taken first. If both were involved equally the right was to be preferred. The reason for that was that the rectal mucosa had been found to be very sensitive to radiation, and that it was better to leave it to the last that it might completely recover from the first irradiation. Eight weeks after the second sitting the other parametrium was treated in exactly the same way.

As to results, of the first twenty-four cases treated by Professor Wintz during the year 1918, at the present moment twenty of these had no sign of carcinoma, local or general, were quite well and attending to all their duties. Time did not permit discussion of the details of the other cases—they would be published in due course.

A quite different technique was adopted for superficial carcinoma—mammary, for example. Here they had a superficial growth which, if small, they might attack with the X-rays alone and with good prospects of success. If a large thick mass this should be removed surgically, and then X-rayed in the manner to be described. The procedure was the same for all cases, post-operative or otherwise. In a superficial case such as they were considering, they had only one port of entry;

how then were they to destroy the base of the growth without undue damage to the skin? Obviously they could not hope for success if they adopted the normal skin distance of 23 cm. In a typical case the whole side of the chest was irradiated for 324 minutes at a focal-skin distance of 70 cm. The thickness of the growth being no more than 3 cm. the difference in intensity at 70 cm. and that at 73 cm. was inappreciable for practical purposes, and the whole thickness got approximately the U.S.D. Then the axilla was irradiated for fifty-nine minutes at a distance of 30 cm., and the clavicular region for the same time and at the same distance. *All this must be done on the same day.* After all such irradiations it took six weeks for the blood and tissues to return to the normal, and as the growth had not yet had the full cancer dose they now gave the whole chest with the arm up one exposure of 348 minutes at a focal-skin distance of 65 cm. Seventy-five per cent. of cases treated by this method in 1917 had been clinically cured without preliminary operation, but as the method had not been in use for more than a few years it was not possible to speak of permanent cures as yet. On theoretical grounds, and so far as practical experience went, these results were superior to anything they had been able to obtain up to the present.

The figures given above were not to be taken as generally applicable: one of the best features of the system was that every dose was worked out in detail by mathematical calculation, and these details of time and distance were carried out rigidly. The above figures had been copied from the notes of a typical case. Superficial glands and tuberculous joints were treated in practically the same way with equally good results.

The treatment of uterine fibroids offered little difficulty by this method. It was necessary to apply only 35 per cent. of the U.S.D. to each ovary, and if skilfully done the skin need not be even discoloured. Some splendid results had been attained in the treatment of malignant disease of the face and neck. Cancer of these parts had always been a serious difficulty to radiologists, but the outlook was far more favourable now than ever before. Cases of cancer of the larynx had been to all appearances clinically cured. In doing a case of this kind there was a danger from œdema of the glottis, and this might necessitate the intervention of the surgeon. A class of cases giving very favourable results comprised tuberculous glands and joints, especially in young subjects. In fact beginners with this system were advised to commence with such until they were confident of success in dealing with the more serious disorders.

It would be difficult to overestimate the importance of these recent developments in radiotherapy. It was not too much to say that it would definitely increase the proportion of curable cases of malignant disease. Cancer would, of course, continue to claim a certain number of its victims, but so long as the lesion was localized the majority of cases could be, at least clinically, cured by this method of irradiation. As he had said, failure was the result of insufficient radiation, and in the past this had been due largely to the shortcomings of their equipment. There would be great difficulties in some forms of abdominal cancer, and of course once dissemination set in they were beaten. They could only hope that they might see these cases before this condition arose. It was unnecessary to describe the system in greater detail just then. It would be seen that it involved no new or untried principle; it strengthened their position enormously, and bade fair to have a most profound influence on radiological and surgical procedure.

Technique of Intensive X-ray Therapy for Fibromyomata of the Uterus.

By L. MARTINDALE, M.D., B.S.Lond.

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Dr. H. G. ADAMSON

spoke of the value and reliability of the Sabouraud and Noiré pastilles for measuring unfiltered rays as used in skin diseases, and was anxious to know if there was any equally reliable method for measuring filtered rays, so that a dose could be given just sufficient to cause permanent destruction of the hair follicles without damaging the skin. He drew attention to the fact that if fractional doses were given, the sum total should not exceed a Sabouraud B dose in one month, so that not more than $\frac{1}{3}$ B should be given every ten days, not more than $\frac{1}{2}$ B every fourteen days, or $\frac{3}{4}$ B every three weeks. If that was exceeded damage to the skin was likely to result. Referring to Kienböck's five-area method for treatment of ringworm, he drew attention to the importance of the distance of the anticathode from the skin. If too far from the skin, the combined dose of marginal rays was more than two half doses. If too near, the total at the margin was too small. He calculated that

7 in. was the correct distance. He also spoke of the different therapeutic effects of rays from a gas tube from those emanating from a Coolidge tube, a larger pastille reading being necessary with the latter.

Dr. SABERTON

drew attention to the fact that the deeper structures did not necessarily receive a double dose by using multiple small ports of entry, as the divergence of the rays from the focal point was not sufficient to obtain overlapping of the rays in the tissues under the skin. This divergence was greater with a larger opening. He indicated that with thick filters from say 4 to 5 mm. of aluminium there was a tendency to cut out the rays which were valuable in the treatment of deep-seated disease, and his experience indicated that 1 or 2 mm. of aluminium produced a better result than the use of heavier filters.

Dr. G. B. BATTEN (in reply)

said he was glad that the dosages mentioned by Dr. Adamson on the whole agreed with his own experience as stated in his introductory paper. With regard to Dr. Adamson's criticisms of his method of treating ringworm at half-time distances, he agreed that theoretically perhaps Dr. Adamson was right, but practically unless one put the head closer than $4\frac{1}{2}$ in. to anticathode he and many others had found this special method quite safe and satisfactory; he himself had treated quite a thousand cases in this way during the last seven years and he had no cause to regret having done so.

Dr. R. W. A. SALMOND

said that it seemed to him that there was a wide division between benign superficial and malignant cases, at any rate in the results of treatment. They all knew of the excellent results in treating the former but it should also be pointed out that equally good results were often got by other means, except perhaps in ringworm. Dr. Russ in his opening of the discussion, had drawn a diagram of a deep-seated tumour and had said that the deepest part should receive a full dose, but in malignant conditions, as Dr. Russ knew, it was much more complex. In such cases, if there was to be any hope of cure or even arrest, the advancing margin of the metastasizing cells had also to receive the full dose and this was probably the real difficulty in these

cases. If one considered the wide limit and depth of these invading cells, one at once realized that it became a very much more difficult matter to give them the full dose, and if they did not receive the full dose the cells would be stimulated and more harm would be done than if they had been left severely alone. There was another point: No matter how heavy the first dose might be, there was probably a stimulating action on the tumour cells for the first few days before the degenerative effect took place, for it seemed reasonable to assume that fractional doses and the earliest effects of multiple doses were stimulating. The moral of all this might seem to be that heavier dosage should be given, but there was another factor which probably had to be taken into account, namely, the question of the lymphocytes of the blood. It appeared from the results of experimental workers that the continual bombardment of the lymphocytes by full doses of X-rays, such as in treating malignant conditions, destroyed them and in this way lowered the body resistance to the malignant infection. It thus seemed likely that X-ray dosage could not be indiscriminately increased even with increased filtration on account of this action on the blood. With regard to the Hampson technique for treating ringworm of the scalp: It had been his fortune some years ago to follow Dr. Hampson at one of the hospitals where a very large number of ringworm cases were treated by X-rays and he had found his method quite practicable, though he would not go so far as to say that he would adopt it in preference to the standard target-skin distance.

The PRESIDENT

said that the discussion, helpful in many ways, had brought home very forcibly the fact that, in respect to deep therapy, they were still groping in the dark, although guiding lights were more numerous than they had been some years back. It might be helpful to other workers to indicate briefly, without going to extremes, a practical line of technique, one that he had worked on for some years, based on the knowledge supplied by physicists and radiologists on the treatment of tumours. There were two questions that required answering:—

(I) What conditions were necessary to produce their therapeutic results?

(II) What was the method of producing these conditions?

The physicists taught, to quote Colwell and Russ, that "the beam of rays had *no effect* on the medium through which it passed unless it was

absorbed, scattered or transformed to some extent by the medium." This gave them the first important condition.

(1) Full tumour or cell *absorption*.

They had stated a second proposition. "The more active the cell the more vulnerable was it to radiation." If they now visualized a tumour as a mass of pathological cells in all stages of activity and depth, it would be seen that to fully affect them all, a maximum dose, that was, a maximum of absorption of rays of *all sorts* of penetration, was required.

This gave a second condition, namely:—

(2) Bombardment of the tumour by a large number of heterogeneous and not homogeneous rays.

Filters.—The primary object of a filter must not be lost sight of—that was to cut out or absorb those rays that were not required. If they went beyond this point, they were nullifying to a certain extent conditions (1) and (2) that they had striven to obtain. For example: A tumour was 1 in. below the surface and 2 in. thick. If they put in a filter of say 6 mm. of aluminium, it was reasonable to suppose that this filter would absorb most of the rays that would have been absorbed by the tumour, and however penetrating the rays, the tumour absorption would be reduced. It was only fair, however, to mention that the question of the effect of filters was complex, but at the same time he considered that the tendency at present was to *over-filtration*. He hoped the day would come when physicists, having been given the approximate depth and thickness of the tumour to be treated, would be able to indicate what filter and dose should be given to obtain full tumour absorption. To sum up, therefore, the conditions necessary:—

(1) Maximum tumour absorption.

(2) Minimum skin absorption.

(3) Large number of heterogeneous rays.

(4) Filter only thick enough to cut out the rays not required.

His maximum skin dose at present, when treating deep tumours of large size, was 20 X through 3 mm. of aluminium twice weekly, the first series being six doses. This was the maximum dose to one area—cross fire was used where possible. *This dose was measured on the skin*, thereby doing away with the question of distance and filter. Under these conditions, marked pigmentation was produced, but no inflammation. In other words, he had found that the skin effect was *not* the same when the rays passed through a filter, although the skin dose, according to their crude methods, was identical.

There was only one more point: If the first series of treatment

appeared to have no effect on the condition, other combinations of dose and filter should be tried before the case was given up.

If these therapeutic conditions were correct, then the present-day tendency was towards over-filtration, the result being the use of a large number of very penetrating radiations.

The Continental method, described by Dr. Morton, was evidently based on quite a different theory—namely, that by using a large number of very penetrating rays for a long period, the therapeutic results were obtained not by the primary beam, but by the secondary radiations set up in the tissues. This ought to be investigated by physicists, as it might materially affect their technique in the future. He considered that the discussion on deep therapy should be held every session until the technique had been more or less standardized.

Section of Electro-Therapeutics.

President—Dr. S. GILBERT SCOTT.

MACKENZIE DAVIDSON MEMORIAL LECTURE.

Physiological Advance : The Importance of the Infinitely Little.¹

By W. D. HALLIBURTON, M.D., F.R.S.

IN 1798 there died in Bologna one who was born and lived there. His name, which has reverberated down the ages, was Aloysius Galvani. Destined for the Church of Rome but later expelled from that body, he happily turned to science and became Professor of Anatomy and Physiology at the University of his native city in 1762. The story of his well known discovery of what was later called galvanism is well known and does not need recapitulation here. Helmholtz writing nearly one hundred years later in an appreciation of Galvani's pioneer work said :—

"When Galvani touched the muscles of a frog with different metals and observed their contraction, who could have dreamt that all Europe would be traversed with wires flashing intelligence from Madrid to St. Petersburg with the speed of lightning. In the hands of Galvani, and at first even in Volta's, electrical currents were phenomena capable of exciting only the feeblest force and could not be detected except by the most delicate apparatus. Had they been neglected on the ground that the investigation of them promised no immediate results, we should now be ignorant of the most important and most interesting of the forces of nature."

Had Helmholtz been alive to-day, how greatly might he have expanded this theme; for even he did not foresee the possibilities of electricity, and its ramification into every branch of our daily life, including its applications for the detection and alleviation of many of our ills. Animal electricity in its medical aspect is, it is true, as old as galvanism itself. In its early days, thinkers imagined the secret of life had been found, and attempts were made to convert dead into living bodies by its means; it soon lent itself to the worst forms of charlatanism and quackery. But as knowledge progressed and ignorance was dispelled, it found its proper sphere, and the importance of the sphere is evidenced by the existence, in our Royal Society of Medicine, of a Section devoted to electro-therapeutics.

To trace even in outline the various steps which have led to the present proud position in which this branch of science stands to-day would be a task beyond my powers, and beyond your powers of endurance, but I may take as my text to illustrate one feature in the advance (if not its mainspring), a reminiscence of my own.

In 1888 I attended at Bath a meeting of the British Association, and as it was almost the first I had been to, I listened to the Presidential and other

¹ At a meeting of the Section, held March 18, 1921.

addresses with great attention. The President that year was the great engineer, the late Sir Frederick Bramwell, and well do I remember how he started his address. He began by alluding to a speech he had heard from the late Lord Iddesleigh, who charmed an audience for a whole evening by speaking on the very important subject, "Nothing." Sir Frederick said he would not try to copy this feat, but would do his best to speak on "Next to Nothing." By this neat phrase he meant those little things which are of supreme importance. He gave numerous examples from his own subject to show how it was that attention to details had converted crude machinery into effective and useful instruments, whether they were guns or bridges, engines or ships. Among other subjects he took to illustrate his theme I remember he singled out the telephone as a triumph of science which the "next to nothings" had done so much to perfect. At that time he was naturally not aware of how in later years, red tapism (and the like) would have taken upon itself to neutralize some of the excellent qualities that science had bestowed upon it. At the conclusion he ventured to prophesy that it would not be long before men were able to fly.

But gifted as Sir Frederick Bramwell was with the prophetic instinct, he did not, at that time, now thirty-three years ago, foretell the discovery of those vibrations which it is now customary to term X-rays, nor of those other kinds of radiant energy which the name of radium calls up. Still less could he have predicted the value of these discoveries to medicine and to surgery, and least of all could he have pictured even in imagination the coming of a man who so fully illustrated the importance of attention to details, to the "next to nothings," a personality whose name we are met together to commemorate this evening. Sir James Mackenzie Davidson, whose sterling and genial character we all remember with affection, was first and foremost one who never spared trouble; he was one whose numerous inventions, the result of his painstaking attention to apparently small and trivial things, succeeded in making the bare bones of the subject live, just as his skiagrams represented them in life-like perspective.

I wish that your Section could have selected someone more capable than myself of dealing with this subject from the technical point of view. But you could not have chosen one who has a greater admiration for the genius and ability of our lamented friend. Your choice has fallen on a physiologist whose labours have been more directed into chemical than physical channels, and I regard it not so much as a compliment to myself as an honour to our band of quiet workers who are seeking out the ways of nature by the way of experiment, and are doing their best to give to the art of medicine the sound basis of scientific knowledge.

For too long the workers in the laboratory, and those by the bedside, have been groping out their own salvation in separate ways. Your request that a physiologist should address you to-night is evidence that the entente between us which is now happily growing needs still further strengthening.

I feel also that it does us all good to get at times out of our own special ruts. I feel this evening renewed vigour as I come into the fresh air of electro-therapeutics; I can only trust that the members of your Section may be able to return the compliment, and find something useful or even instructive in what I have still to say, even although it deals in the main with another corner of medical science than the one they are accustomed to live in.

I am not here only to utter sentiments, however heart-felt, or platitudes, however true; still before coming to what, after all, is my main

subject, there is yet one general consideration which I should like to place before you.

The crowded condition of the medical curriculum in which the poor unfortunate student is presented with an ever-growing number of subjects for study while the length of the day still remains at the usual standard of twenty-four hours, is producing now one of those attempts, which recur periodically, to revise his scheme of study. We are told that there is no need for him to learn his anatomy so thoroughly, that his organic chemistry must be reduced to a minimum, and last and worst his physiology course must be drastically shortened, and this in spite of the fact that these subjects are growing fast, and that medical men are seeing more and more the truth that physiology is the corner-stone around which the superstructure of medical science is built. Although physiology still figures on paper as quantitatively large, the restriction suggested is in the kind of physiology to be taught, and the words "applied physiology" designate that what is wanted for the student is physiology in its direct bearing on medical practice. The frog, which has served for so long as the object lesson in so many physiological questions, is to be deposed from its high position, and so far as is possible, experiments on man himself are to be substituted.

In speaking of Galvani's work I have already given you one example of how a subject of purely scientific interest, studied with no ulterior or utilitarian motive, was found to be of inestimable value to mankind. Such instances could be multiplied indefinitely. How would Lister's work have been possible without the preliminary academic labours of the chemist Pasteur? When Miescher set out to investigate the chemistry of the roe of the salmon, did he think that it would be on that investigation that our knowledge of the pathology of gout would be founded? When Bayliss applied himself to the study of colloids he could not have dreamed that a powerful weapon against wound shock would be discovered in that by-path. But I need not weary you with other instances. When a scientific man studies nature for the sake of pure knowledge, who can say to what practical use his followers may adapt it? In deciding in my own mind whether I approve or disapprove of these attempts to reform or revolutionize medical training, I am torn by conflicting emotions. On the one hand I sympathize deeply with the student, and realize the impossibility of getting a quart into a pint jug; on the other hand there is my love of pure science and the conviction that any and every truth must ultimately bear practical fruit. I am not conservative by nature, and welcome every true reform, and I have but little sympathy with the famous professor¹ of mathematics who, in reference to a piece of brilliant mathematical work, told his colleagues that "the most delightful thing about it was that under no conceivable circumstances would it be of the slightest use to anyone." One has, in such an impasse, to face facts and exercise one's common-sense. A thorough grounding in general physiological knowledge must remain a *sine qua non*, but in the details of its many ramifications one must

¹ While this was going through the press Sir John MacAlister wrote to me a letter from which I quote the following sentences which really point in a striking way the moral of what I said: "I was dining last night with an old friend and colleague of Professor Caley's, and reminded him of the story you have quoted in your lecture. He assured me, as I always believed, that it was 'only his fun,' for no one had a firmer faith in the value of all pure science, and his remark was only a sarcasm at the expense of the so-called 'practical' scientists. The particular piece of work he was referring to ultimately proved to be a remarkable example of the very thing you are aiming at. The working out of the problem became known as 'Caley's Tree,' and proved to be the missing link in the efforts of chemists to arrive at a solution of the arrangement of atoms, and enabled them not only properly to order their discoveries, but successfully to prophesy new ones."

make a judicious selection, and the choice must naturally first fall on those parts of the subject in which the practical outcome is already realized rather than on those the application of which is still to seek. From the point of view of those in this Section, and of those who aspire to join its ranks later, one trusts that the electrical phenomena which are so easily demonstrated in all essentials on the muscles and nerves of frogs will not fall under the ban of those who are trying to limit the excursions of the student into the scientific aspects of the subject.

In speaking further I thought the occasion might not be inopportune to say a few words on some of the modern problems of physiology, and tell you briefly the progress we have made and are making at the present time. To attack all these questions in the space of a single address would be impossible. Again, one has to make a selection, and I intend to limit myself to three. I think it will be found in these three cases the importance of the "next to nothing" principle will be abundantly illustrated. This is the day of great things, because we are realizing the importance of the infinitely little.

The invention of the word "hormone" dates from the discovery made by Bayliss and Starling of the chemical messenger which is elaborated in the intestine under the influence of the gastric acid, and which after absorption stimulates the pancreas to pour out its juice at the time when it is wanted to carry on to completion the digestive work begun in the mouth and stomach. Previous to this time we were imbued with the teaching that the harmonizing or, to use Sherrington's phrase, the integration of the bodily functions is due to the activity of that ruling system of the body known as the nervous system. The nervous system is not displaced from its high estate, but for the first time in the history of our science, we realized to the full the valuable help rendered to the telegraphic service of the body by humbler but none the less useful ministers to our comfort which Starling aptly compared to the postmen. Although the actual word hormone was not coined until secretin was discovered by Bayliss and Starling the importance of chemical agents had been really recognized earlier, and more especially in relation to that group of formerly mysterious organs, known then as the ductless glands, but now generally dubbed the endocrine organs; they are so called because they form an internal secretion, that is a secretion which leaves by no specific duct, but by the blood or lymph that streams from the organ in question. It was no wonder that ignorance prevailed for so long as to their function, seeing that the new chemical principle each forms is masked by the protein-rich fluid which it enters. But now, thanks to the overcoming of this and other difficulties, we know a good deal about the thyroid, the adrenal body, the pituitary gland, the islets of Langerhans, the corpus luteum and others.

Many details have still to be worked out and some of our ductless glands are territories almost as unknown as Central Africa was in our youthful days. The chemical messengers are all grouped together under the general name hormone, a term which immediately "caught on." Attempts have been made to distinguish classes among the chemical messengers to indicate that some stimulate, some depress and so forth. But the terms introduced with this object by Sharpey Schafer, and more recently by Gley, have not yet at any rate passed into general usage. Speaking of our French colleague, Professor E. Gley, reminds me that the term "internal secretion" was first employed by another great Frenchman, Claude Bernard, in relation to the liver's important work in pouring sugar into the blood stream at a steady pace.

In most cases the index pointing the way to discovery has been the

result of removing the organ and of injecting extracts of it into the blood and noting the results. Professor Gley has recently, in one of his published discourses, laid down the conditions which must be fulfilled in order that a gland may be admitted to the class of endocrine organs. He very properly decries trust being placed merely upon the results of ablation or the effects of injecting extracts. In addition there are three main conditions which must be conformed to in order that a gland may be enrolled within this category; first the anatomical, i.e., the absence of a duct; secondly, the chemical, the recognition in the venous blood of such organs of a specific chemical product; and, thirdly, the physiological, the possession by the venous blood of specific physiological properties; and this last is of course the superlative test. He takes the work of Bayliss and Starling on secretin as an example; it was not until Fleig, and Enriques and Hallion actually worked with the venous blood coming from the duodenum that the probability of the truth of Bayliss and Starling's views founded upon the results of injection of duodenal extracts was rendered a certainty.

Professor Gley has done good service not only by his own experimental work, but in pointing out the way in which work on this subject must be continued. For we must confess that up till now, our conclusions in reference to many of the endocrine glands do not rest on experiments which fulfil all of Gley's conditions. We must further recognize that it does not follow that because most of these ductless organs form internal secretions, that all of them do so. Nature seldom works in one pattern, but her *modus operandi* varies. The parathyroids for example probably form no substance useful to the rest of the body's machinery, but probably act by removing or neutralizing harmful products formed elsewhere. Noël Paton and his colleagues have shown that the poison they detoxicate is a guanidine compound derived from muscular metabolism and if this is not removed, tetany is the result.

Restricting ourselves, however, to the truly endocrine glands let us dwell for a moment not on what we know, but on the gaps in our knowledge. The chemical constitution of that iodine complex which is secreted by the thyroid has been unravelled by Kendall in America. The constitution of adrenaline secreted by the suprarenal medulla is so well recognized that it has even been synthesized by laboratory processes. The composition of pituitrin secreted by the posterior lobe of the pituitary body looks as though it will be the next to yield to the chemist's manipulations. But what do we know of the internal secretion of the part of the pituitary which is probably most essential to life, or of that of the suprarenal cortex which is certainly the most important portion of that gland, or the nature of the internal secretion of the pancreatic islets, or of the corpus luteum in the ovary and even of secretin itself? I mention these few hiatuses in our knowledge to illustrate how much our wisdom is in its infancy, what fields are still to be tilled, and lest we swell with undue pride at our present accomplishments. But whatever gland we think about we may be sure that quite minute quantities of their various secretions are sufficient to do the necessary work, and that these infinitesimally small amounts are indispensable not only for our well being but for life itself. This at any rate has been proven for those secretions which can be quantitatively examined. Even although our knowledge of pituitrin is still over the border, we know that extreme dilutions of pituitary extract can exert marked power in causing plain muscle to contract vigorously and in the case of adrenaline one can demonstrate that the injection of a few cubic centimetres of a solution containing only one part in a million or more of a neutral saline diluent will provoke marked physiological effects on heart and blood-vessels.

Other examples of organic substances which call forth physiological effects in equally minute or even more attenuated concentrations might be given; there is for instance an acetyl derivative of choline, one of the constituents of our body, and the powerful amine known as histamine which may be mentioned. In anaphylaxis also, similar infinitesimal amounts of organic substances produce gigantic effects.

Such minute doses make the doses of that product of a past generation known as homœopathists seem enormous in proportion; a reflection which will awake an echo in the hearts of those who deal with radium emanations.

From the days when we learnt physics, we doubtless remember that important natural law which states that action and reaction are equal and opposite. The law holds in the opposing activities of our hormones, and an important branch of study has been to ascertain how such opposing actions are balanced so that they work together for good. The way in which the different organs, endocrine and otherwise, act and react upon each other has been one of the most instructive and interesting outcomes of the discovery of the internal secretions themselves. I do not think one could find any other subject which has in the present day so deeply influenced medicine as the hormone conception. Instead of remaining, as many physiological discoveries have remained, dormant as praiseworthy laboratory curiosities, the application to the practical study of disease has here been immediate, and medicine, surgery, gynecology, and the numerous specialties of practice have all been profoundly influenced by the new doctrines. Among the specialties one must here particularly allude to the one represented here this evening. Those who on the one hand are employing in diagnosis and treatment various electrical forms of energy, and those who are similarly engaged in radiology, have recognized that they have the power of controlling and influencing the endocrine organs to form more or less of these internal secretions for the benefit of their patients. I wish I had the special knowledge to dwell for a moment on this aspect of the problem, but those who are listening to me will be able to fill in the details of this part of the picture. The discovery of radium has been one of the greatest feats of modern science, but I need not tell my hearers that this new power for good may, like the X-rays, be also in unwise hands an equally powerful agent for evil. When the activity of its emanations on living cells was first demonstrated there was perhaps naturally too great confidence displayed in its ability to cure every ill, including those which, like cancer, had defied every previous effort to conquer them. That phase is now passed, and the proper place of radium in our armoury is being adjusted to the facts. History is always repeating itself and the story of radium is a repetition of what has occurred before when startling new discoveries have been revealed to the world. In the old days of the alchemists who sought by magic and by the help of astral and similar agencies to discover the philosopher's stone and the elixir of life, the disappointments and failures were as numerous as the attempts to discover the secret of vitality. When alchemy was replaced by more exact science, new revelations were wistfully and hopefully regarded as likely to yield the long hidden secret; two of these epochs I have already alluded to to-night—one was the discovery of galvanism in the eighteenth century, the other of radium in the twentieth. May I digress and linger a moment to mention one more which marked a similar epoch in the seventeenth century? I allude to the discovery of phosphorus. In the early years of that century a substance was prepared by heating heavy spar with combustible

organic matter (egg white and charcoal) and this substance glowed in the dark, and for many years the name phosphorus or light bearer was given to any substance which had the same property. The actual element we now call phosphorus was prepared by Brand about 1670, and was at first made in small quantities only, from animal products, viz., urine and bones. Can it be wondered at, that in those days of superstition and mysticism the discovery in animal products of a substance which burnt and emitted light without ignition was hailed as a discovery which at last had hit upon the vital principle. Phosphorus played an important part in the development of the theory of phlogiston which soon afterwards dominated philosophic thought, but in time died like so many other theories before and since. The *furor* created by the discovery of phosphorus has been paralleled by the discovery of radium in recent years. Only let us congratulate ourselves that the 250 years which intervened between the two events have taught us more wisdom and we are not so likely to repeat the hysterical enthusiasm of our ancestors.

This, however, is a parenthesis which originated from my mention of the fact that hormones and all that they connote are not simply of chemical interest, but that their importance is recognized as a factor in electro-therapeutics as in other branches of medical science. I do not think I can say the same thing about the second subject I have selected to bring before you. My only excuse for so doing is that it is one on which I can venture to speak at first hand. It may not interest you as electro-therapists, though it is not devoid of importance to you as human beings, for to all living creatures the question of food is of superlative value. The particular portion of this wide problem I intend to say a few words about is one in which also the quantitatively little is qualitatively great. I allude to those substances in our diet which we term "the vitamins." The word vitamin is not as old as the present century, and although it is not an ideal term it has come to stay, and is certainly less cumbrous than the phrase "accessory food factor" which is its synonym.

Foods as they occur in nature contain not only the proteins, fats, carbohydrates, salts and water necessary for sustenance, but in addition these accessory materials without which growth, health and even life itself are impossible. It has been experimentally proved that the main food principles in a state of purity are quite unable to maintain life by themselves unless the vitamins are present also. Sophisticated, fractionated, doctored or patent foods should therefore be avoided like the plague.

My friend, Professor Hopkins, of Cambridge, has introduced a helpful simile to aid us in grasping this fundamental fact. He compares the building of the body to the building of a house. The stones, bricks, planks, &c., would be of no service, unless cementing material and nails are used also. It is the cement and nails which he compares to the vitamins. The analogy must naturally not be pushed too far, for the chemical nature of the vitamins is not yet known, nor is the precise manner in which each acts a matter of certainty. But it is correct in one sense, a quantitative one, for just as the cement and nails form but a small portion of a house, so the vitamins are only present in insignificant quantity in the food. The smallness of the amount is remarkable. The addition to a diet of purified food stuffs, of a few cubic centimetres of a food made in Nature's own laboratory (such as milk) is able to convert the useless food material once more into an efficient diet. This amount, small though it is, is quite indispensable. The very minute amount of these materials, moreover, it is, which has prevented previous observers from recognizing them.

For so many years it has been customary to associate disease with the presence of a positive agent (poison, toxin, bacterium, &c.) that the idea that disease could be caused by the absence of an indispensable ingredient took some time to sink in. But the existence of what are called deficiency diseases now rests on a firm foundation and of these the best known are beri-beri, scurvy, rickets, pellagra and probably also dental caries.

The vitamins are numerous. All are products of the plant-world in which they are also indispensable, and animals rely ultimately on their vegetable food for these ingredients of their bodies. Up to the present, research has mainly centred around three of them. Though as I said they are so far chemically obscure they are distinguished by differences in their source, differences in their solubilities, differences in their action, and finally, differences in the maladies produced when they are absent.

Adopting the non-committal nomenclature of our American confrères, it is now customary to allude to them as A, B, and C. The completion of the alphabet is for the future.

Vitamin A is contained specially in the green parts of plants, which, eaten by an animal, is taken up by its fat, as it is so soluble in fatty material.

The cow eats grass, the vitamin passes into her milk, and gives to butter its supreme value as compared to butter substitutes where owing to the high temperature employed in their manufacture, any vitamin A which might have been present is destroyed. The present day popularity of margarine, which we owe to the skill of the manufacturer in rendering it palatable, is really a source of danger to the public, and especially to the growing section of the population, for this particular vitamin is the one specially concerned in growth. In well-to-do people on a mixed and ample diet there is very little risk of deficiency disease, for what they miss in one article of diet will be found in another. But to the poor children, whose straitened circumstances compel them to eat the cheapest, there is the danger that rickets and stunted growth will increase if their reliance for a source of fat is entirely confined to the cheaper forms of vegetable margarine.

Rickets (and in this term I will include for the moment bad teeth also), is no doubt a condition into which many etiological non-hygienic factors creep; but, after all is said, it is a disease in which diet plays the most important part, and so fully are the majority of observers convinced that absence of vitamin A is the root of the evil that it is usual now to speak of it as the antirachitic factor.

Vitamin B is contained in the grains of cereals; it is soluble in water, and in highly milled grains is removed by the polishing process, for it is in the embryo plant on the surface of the seed where it is made and is present.

The use of highly polished rice in the East it was that led to the development of the terrible scourge of those nations which is called beri-beri. It can be cured and prevented by adding the polishings of the grains to the diet. The use of superfine white flour which is derived from highly milled wheat is another similar source of danger. As neuritis is such a prominent symptom of beri-beri it is usual now to speak of vitamin B as the antineuritic factor. It is essential, like its fat-soluble companion, for growth, but the deficiency disease its absence produces and which culminates in paralysis and death may come on at any time of life. This has been proved not only by experiments on birds which are specially susceptible, but also by observations in man.

Vitamin C is the antiscorbutic factor; it also is soluble in water, and is obtained from fruits, and such edible vegetables as the potato and turnip.

It was the absence of fresh fruits and vegetables in bygone times, when the long voyages of sailing ships rendered it impossible to get these commodities, that made "the scurvy" the curse of the Navy and mercantile marine. In our own day similar deprivation, such as occurs in Arctic expeditions or in prolonged sieges during war-time, has led to the outbreak of scurvy once more. Infantile scurvy due to ignorance of infant feeding is an ever present danger, but as is well known can be easily cured by the administration of the juices of the lemon and similar fruits. Of all the vitamins it is the one most susceptible to damage; prolonged heating, canning and similar processes are all inimical to it. Among the many pieces of information which have followed its thorough investigation, especially by Miss Chick and her colleagues at the Lister Institute, is that these tinned and preserved products once more regain their antiscorbutic power on being allowed to germinate. This one piece of knowledge saved thousands of lives during the recent war.

Pellagra, another disease of distant lands, I also mentioned. It is quite certain that this is also a deficiency disease, but whether the deficiency is of a specific vitamin, or due to deficiencies within the proteins of the maize grain, is a matter in which experts are at present agreed to differ.

After this short review of the vitamin question, may I point out here that this subject has a future before it? It seems probable that our list of three may be extended and that many other obscure maladies will be found to fall into line with those already mentioned, and thus as their causes become known, their relief or cure will follow as a matter of course. It is always unsafe to prophesy, but I venture to think that the blessed word vitamin may have before it a future as far reaching as the word hormone, on which I have already spoken.

Before I leave the subject of food there is one other sentiment (and it is not much more) of which I should like to get an opportunity of unburdening myself. Most of us who are specialists in one line or another, are apt to pose as extra-learned; but when we are ill we all experience the comfort of the attention of a general physician. The physiologist may think that his doctor could not justify his advice in all cases if he were asked to defend it on physiological grounds, but even if the treatment is purely empirical, the patient will be wise if he does as his doctor tells him. For what is empiricism but the result of the experience of the past? Take for example a prescription of cod liver oil, or of butter and cream. A few years ago it would have been impossible to explain why these forms of fat are superior we will say to olive oil and vegetable margarine. The mere fact that they are better was empirical, and now the practitioner has been fully justified and research at last has told us the explanation, namely, the existence in the fats, which are the more valuable for remedying malnutrition, of this health-giving vitamin.

May not this in the future be repeated? If you have high blood-pressure why does your medical man tell you you may take fish and poultry and eggs, but that you must abstain from beef and mutton. I can picture a sceptical and argumentative physiologist saying "Why? The materials you mention and I am advised to take or refrain from taking are all in the main composed of protein, and surely it is not physiological to give me such advice." My answer to this would be: "True, it is not explicable yet on physiological grounds. It is the mere result of empirical experience. But wait a few years and it is quite on the cards that by that time science may have stepped in and explained the puzzle, just as a few years ago it was able to explain why cod liver oil is better than olive oil." There is probably in the

harmful meats some hitherto unrecognized principle, unrecognized because it is present in minute quantities : or it may be the absence of an indispensable material. It is one of the "next to nothings" but it makes all the difference.

Any student of literature will know that the great writers of the past who were students of nature in general and of human nature in particular often express physiological truths in striking language, though they never learnt physiology in the modern restricted sense. How often for instance Shakespeare will pithily put in terse and picturesque words the main features of a physiological or psychological event. I am, however, not going to quote Shakespeare to-night, but another ancient writer, and if our patient is not too ill he will find the sentence which fits his case in the burial service. "There is one kind of flesh of men, another flesh of beasts, another of fishes, and another of birds." I wonder if St. Paul ever imagined these pregnant words contained more than what he intended to convey by them.

But my third topic, which is quite on different lines from those I have yet spoken about, demands that it is now time that I should give it some attention. It again deals with small things, though not quite so microscopic or un-get-at-able as the hormones and vitamins. I allude to our capillary blood-vessels and the flow of fluid along them. The pumping action of the heart, the flow of blood along the arteries and veins are but means to an end. That end is the production of a steady and slow stream of nutrient fluid in these minute vessels which taken together are often spoken of as the capillary lake, an expanse really of great magnitude. Slow though the flow is here, the time occupied by any particle of blood in traversing its own appointed short course through the capillary network cannot be longer than a second, and it is during this short space of time that the blood performs its duties in reference to nutrition ; small wonder therefore that efficiency is here the watchword and this is the reason why physiologists and pathologists alike have devoted so much study to this part of the circulatory system. The importance of such study has been brought home to us all by the recent war, a stimulus to discovery so potent that probably during those fateful five years more progress has been made in medical science than had been the result of the preceding fifty or more years of comparative peace. The condition known as "shock" it was that brought our capillaries into prominence, and though the topic has no special or immediate relationship to electrology or radiology, the word itself has an electrical thrill about it.

The word shock without a qualifying prefix covers a multiplicity of conditions, but it is not nerve shock, shell shock, or anaphylactic shock of which I want to speak, but what is known as surgical or wound shock, or rather of one special variety usually termed "secondary shock." The condition of collapse in which a severely wounded man is thrown is due to a diminution of the amount of blood he has in active circulation. He, therefore, feels cold, and warmth and fluid food are thus indicated, but in urgent cases food and warmth alone cannot restore him unless means are also taken to replace rapidly the amount of blood to his circulation. Sometimes the loss of blood is due to actual hæmorrhage ; this can be then counteracted by the transfusion of blood or of Bayliss's gum saline solution. But in other and more puzzling cases all the signs of loss of blood are present although the hæmorrhage may have been but trifling. This condition is due to the patient "bleeding into his own vessels," a phrase which I believe originated with the late Dr. Milner Fothergill. It is well known that in extreme dilatation of the vessels of one area such as that in the abdomen, the blood from other parts may collect in

this reservoir and be thus withdrawn from active service to other more important regions. It was in relation to such an event that Dr. Fothergill hit upon the phrase some fifty years ago, but in secondary wound shock there has not been found to be any such condition of the splanchnic or similar areas, and so the blood which has disappeared cannot be accounted for in that way. The fall of pressure due to the disappearance of the blood from where it is wanted cannot therefore be due to a failure of the vasomotor mechanism. But still blood has gone out of effective circulation and it must have got side-tracked and stored up in a stagnant condition somewhere, and the conviction was forced upon investigators and confirmed by observation and experiment that the place to which the blood had gone was the capillaries. In the capillaries leakage of plasma occurs and so the volume of fluid is reduced. The extent of the vascular network varies greatly in different regions. In the comparatively inactive skeletal tissues capillaries are few and far between, but in the actively vital portions of our structure, such as the lungs, glands and muscles, they are relatively very abundant. Some of these tissues, notably the muscles, are not always doing hard work, and in the periods of rest, we see a parallel in the amount of blood present, as compared with the period of activity. There is always the potential presence of innumerable streams, but in repose many of these are closed and empty. The few which remain patent are sufficient for circulatory needs. This was recently strikingly shown by Krogh's work in which he presented pictures drawn from actual microscopic observations. Until one saw these drawings, I do not think anyone realized how great are the differences, and therefore how vast is the total area in which blood might stagnate under conditions in which the driving force is lessened.

All of us knew that the amount of capillary blood is a variable quantity, but the variations were attributed to differences in the size of the inlets into the capillary lake. Relax the arterioles leading into the capillaries, the capillaries will be flooded; constrict them, the capillaries will be comparatively bloodless. This mechanism controlled by the vasomotor nervous system is undoubtedly of prime importance, but it is not the whole story. Any physiologist in former days who ventured to suggest that the capillaries themselves possessed an independent and inherent power of altering their calibre was looked upon almost as a crank; but to-day, thanks to the labours of Krogh in Denmark, and Dale in this country (to mention only two of the more important investigators), the physiologist preaches this formerly heterodox view as pure gospel. The adjudicators of the Nobel prizes have seen the importance of this work, and we all join in congratulating Professor Krogh on being selected as the prizeman in physiology last year. Let us hope that Dr. Dale will be in due time also recognized in an adequate manner.

The capillaries are destitute of muscular tissue, but they are made up of protoplasmic cells, and protoplasm possesses in common with muscular tissue the property of contractility. Whether there are actually capillario-motor nerves is still under discussion, but so far as one can judge it appears very likely that they do exist. It has, however, been definitely proved that there are various chemical materials which affect the capillaries sometimes in the same way as they affect the arterioles, and in other instances, and here is the important datum, in a direction which is different. The conclusion seems inevitable that in the normal blood are certain chemical principles which influence capillary calibre independently of the arterioles. What these substances are is still in the realms of speculation but also happily in the realm of modern investigation. It, therefore, seems that in this form of shock the

normal hormones are at fault, or counteracted by a still more powerful poison. What would such a poison be? In answering this question is where Dr. Dale comes in. It is noticeable that in severe cases of shock, even if the hæmorrhage is insignificant, a very frequent and significant accompaniment of the condition is crushed and lacerated tissue. Such tissue readily undergoes chemical as well as anatomical breakdown; it becomes the easy prey to the disintegrating action of bacteria, and it was only natural to search among the disintegration products of protein (the most abundant substance present in all protoplasm) for the poison. Experiments with extracts of crushed and disintegrated muscles, showed that their injection into the blood stream of a healthy animal produced all the symptoms of shock, and engorgement of the capillary reservoir without necessarily affecting the vasomotor nerves to the arterioles.

A study of the protein molecule has shown that it is a complex of many nitrogenous building stones, but in the majority of these the nitrogen is contained in the atomic group called the amino-group NH_2 . A protein in other words is a long and complicated chain of amino-acids. These are fatty acids in which one or more hydrogen atoms are replaced by the combination NH_2 . Some, such as amino-acetic acid (glycine) and amino-caproic acid (leucine), are comparatively simple. Others, such as tyrosine and tryptophane, are amino-derivatives of more complex organic acids, and among this more complex set is one which is known as histidine (imidazole-amino-propionic acid). Without wishing to trouble you with too much chemistry, I must still further expound this consideration in one particular. By the action of micro-organisms these amino-acids are split up in such a way that the group CO_2 is removed from them, and thus they are converted into what chemists call amines, and many amines are powerful poisons. Thus leucine, an innocuous substance, is changed into iso-amylamine, and tyrosine into oxyphenylethylamine, both of which bases exert a pressor action on blood-pressure similar to that of adrenaline; it is probable that these materials produced during intestinal putrefaction are absorbed and play a part in raising the blood-pressure which is such a frequent result of intestinal intoxication. Sometimes these bases are found in plant diseases, and in the familiar one known as ergot of rye, oxyphenylethylamine or tyramine as it is called for short (indicating its origin from tyrosine) is a constant product. But the one of all others interesting to us here is the amine derived from histidine; its chemical name is imidazole-ethylamine, but its pet name is histamine; and very small doses of this act in the way contrary to that of tyramine and lower blood-pressure enormously.

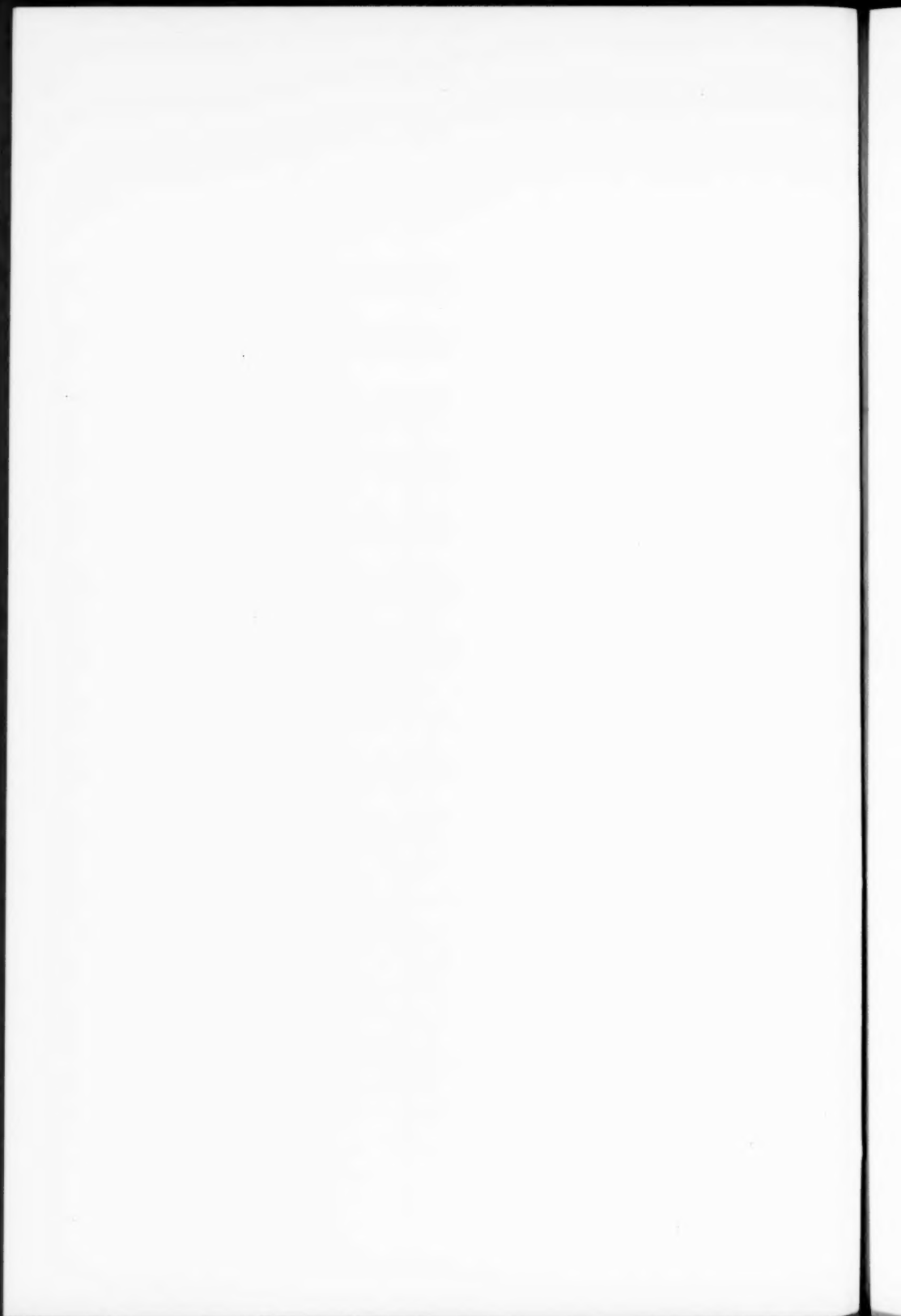
Dale has devoted much work to the histamine question, and has demonstrated that its action is not on the arterioles, but it reduces capillary tone and dilates these vessels to such an extent that the heart is deprived of its normal supply of fluid, and so it is unable to maintain its efficiency as a pump, and thus the blood of the body collects in the capillary lake, stagnates and leaks there, and is thrown out of effective circulation. The phenomena in fact of histamine shock imitate to an amazing degree those of secondary wound shock, and are produced by miraculously small amounts of the drug.

My friend, Dr. Dale, like all careful workers, is a cautious man. He does not jump to the conclusion that histamine is the active agent in producing secondary traumatic shock, but I think one is justified in saying that if histamine is not the cause of wound shock it enables investigators readily to produce shock and study it. If it is not the actual poison, or not

the only poison, the net result must be due to poisons which act in the same way, and have presumably a similar origin.

I wish it had been possible to have told you the many details of the story. But even its outline may be new to some of my hearers, and I have taken it as an example of present-day progress in our attempt to understand the workings of our body, and it would have been difficult to find a happier one. The discovery of the cause of any disorder, or even of its approximate cause, is the first great step forward. The discovery of methods to combat it follows later. This consummation is, however, for the future, though at present much can be done to alleviate the condition, as those who are here and have seen these cases at the front will know. The *entente* between the physiologists and the pathologists has been cemented by our recent trials—long may it live.

In conclusion, I must thank you for the patience you have exhibited in listening to me for so long. I wish I could have chosen a subject or subjects more akin to your own speciality, but if anything I have said in my disjointed remarks will help you to realize how widespread is the importance of the infinitely little, my task will not have been in vain.



Section of Electro-Therapeutics.

President—Dr. S. GILBERT SCOTT.

The Therapeutic Action of the Constant Current.¹

By W. J. TURRELL, M.D.

LET us first consider the theory of ionic medication. The term "ionic medication" can only mean the use or application of medicine carried into the tissues of the body, in an ionic state, by the electrical current: or in the words of Dr. Priestley, by this means medicines "are made to operate without being taken into the stomach."

According to the late Dr. Lewis Jones, "ionic medication is used for the introduction of drugs into the superficial parts of the body through the surface, and also for modifying the chemical constitution of parts of the body, such as joints, fibrous tissues, or nerves, by the setting up of chemical interchanges throughout their substance."²

This passage indicates two entirely different processes: the first claims to be the introduction of drugs into the superficial structures, and, I presume, their effect in that region, though this point is not made clear, nor is the depth to which they are introduced stated except in very vague terms. The action said to take place is in accordance with the usually accepted meaning of the term, though most electro-therapists who practise ionic medication state that it goes far deeper. For instance, they claim to treat the knee-joint by the specific action of such drugs as the salicylates electrically introduced as ions through the skin, or to treat sciatica and other conditions by the action of this or other drugs similarly introduced. The second process as defined in the above quoted passage has nothing whatever to do with ionic medication in the general acceptance of that term, but in reality constitutes a claim for an electrolytic action of the galvanic current throughout the whole of the inter-polar path.

For the following reasons, and in view of the experiments which support them, neither of these contentions appears to be justified.

First, the products of electrolytic decomposition during the passage of an electrical current appear only at the electrodes. This was originally pointed out by Faraday. In the face of this fact it is difficult to visualize any electrolytic action of the continuous current throughout the whole of its inter-polar path through the tissues of the body.

Secondly, while a salt is in an ionic state, its chemical affinity, as Nernst states, is temporarily replaced by its electrical charge. When it reaches the electrode it surrenders its electrical charge, and regains its chemical affinity. The fact that during its passage as an ion no chemical changes are produced is well shown by some simple experiments.

Take three glass test tubes, A, B and C. Fill C with a 1 per cent. solution of potassium iodide, and A and B with a thin emulsion of starch, to which a

¹ At a meeting of the Section, held January 21, 1921.

² "Ionic Medication," 2nd ed., 1914, pp. 1, 2.

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little salt solution may be added to increase its conductivity. Connect the tubes A, B, and C with narrow strips of coagulated egg albumen, obtained from the white of a hard boiled egg. In the tube C place the negative electrode of zinc, copper or other metal, and in the tube A place the positive electrode of platinum wire in contact with the end of the strip of coagulated egg albumen submerged in the starch emulsion. Pass a continuous current of about 2 ma. for from thirty to forty minutes. The contents of the tubes B and C will then be found to be chemically unaltered, but in immediate contact with the platinum positive electrode in the tube A there will be found an intense blue discoloration of the white of egg in immediate contact with the electrode due to the starch iodine reaction.

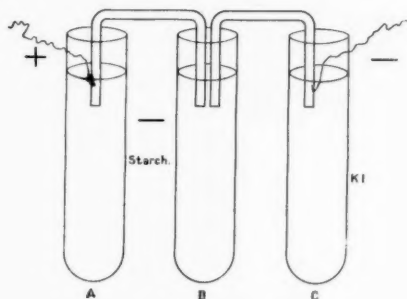


FIG. 1 (author's experiment).

This experiment shows that the very delicate starch iodine reaction fails to reveal the presence of any free iodine, except in immediate contact with the positive electrode, where the iodine ion having passed through the tube B without producing any chemical change, surrenders its negative electrical charge to the positive pole, and regains its chemical affinity as an iodine atom.

The two following experiments were first performed by Chatsky:—

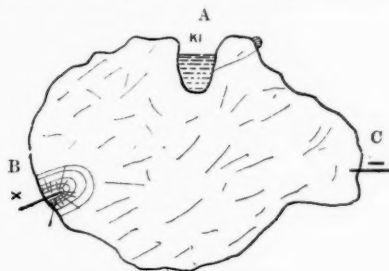


FIG. 2 (after Nogier).

(1) A hole is scooped in a potato at A, and filled with a 1 per cent. solution of iodide of potassium, platinum wires are inserted into the potato, the positive at B and the negative at C. A continuous current of about 4 or 5 ma. is passed for thirty minutes. Then, on bisecting the potato

through the points of insertion of the electrodes, a short pencil-like rod, clearly and sharply defined, of an intense blue colour due to the action of the liberated iodine on the starch of the potato, will be seen starting from the positive pole and directed towards the hole A.

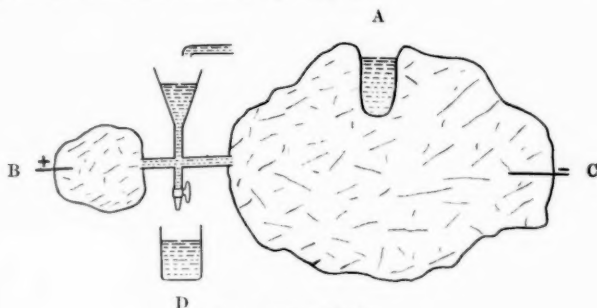


FIG. 3 (after Nogier).

(2) In Chatsky's second experiment, two potatoes are connected by a cross-shaped glass tube, through the vertical portion of which a continuous stream of 2 per cent. sodium chloride solution flows in a transverse direction to the electrical current. A solution of iodide of potassium is inserted in the hole A as in the first experiment, and an electrical current is passed. In this case no blue discoloration appears at the positive pole, but a slight blue colour can be detected in the vessel D, into which the vertical stream of sodium chloride solution flows. This experiment is intended to illustrate what takes place in the human body, when a drug in the ionic state, having carried the electrical charge through the skin, yields its electrical charge to a hydrogen atom and is carried to the kidneys or elsewhere in the body by the transverse blood-stream.

Thirdly, according to Sir Oliver Lodge in his "Modern Views of Electricity," "at a change of liquid another set of atoms continues the convection, and nothing very particular need be noticed at the junction." Thus the current, having been carried through the skin by the ions supplied by the salt solution in the pads, is then mainly carried by the hydrogen and hydroxyl ions present in the tissues.

Fourthly, the very low velocity of the ions at the small potential utilized in "ionization" entirely precludes the possibility of their deep penetration during the time occupied by an electrical treatment.

Fifthly, there is no evidence forthcoming that, if the drugs did penetrate to the depths stated by the holders of this theory, they would exercise the therapeutic effects attributed to them. For instance, even if such drugs as the salicylic or the lithium salts were capable of being conveyed to the deeper tissue, there is no evidence that they would exercise any appreciable effect in those regions in the very minute quantities which could possibly penetrate in this way. On the contrary, in general therapy we give such drugs in large quantities and in often repeated doses, with a view to some neutralizing action possessed by them on the blood in certain conditions. No special benefit is alleged to follow from the local injection of these drugs to the diseased area. Again, even where such a drug as cocaine can be electrically introduced to the sensory nerve-endings of the skin, its action, when applied in this

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way, has been found to be uncertain and unsatisfactory, and by no means so efficient as when introduced by hypodermic injection.

Sixthly, a large experience shows that equally good results are obtained by soaking the pads with simple solution of sodium chloride as by using solutions of such expensive drugs as sodium salicylate, iodide of potassium, &c.

Lastly, careful experiments by experienced chemists, both in this country and in France, have failed to detect the slightest trace in the tissues deeper than the subcutaneous area of any salicylic salt after prolonged and intensive electrical treatment with the drug. I am indebted to Dr. Levick, electro-therapist to the Shepherds Bush Orthopædic Hospital, for the following report of an instructive case under his care:—

"A patient suffering from sciatic nerve degeneration, complicated by ischæmia of the foot, was about to undergo amputation of his leg. He allowed me to perform the following experiment: Two ionization pads, each consisting of sixteen layers of lint, were bandaged to his foot, one on the dorsum and the other on the sole. The pad applied to the dorsum was soaked with a solution of sodium salicylate. The pad applied to the sole was soaked with tap water. The usual precautions were taken to prevent short circuiting between the pads. Metal gauze connected the pads with the galvanic current regulated by a shunt resistance. The pad containing sodium salicylate was made negative, and a current varying from 60 to 70 ma. was run through for three-quarters of an hour. An hour and a half later the patient was taken to the theatre and his leg amputated.

"Dr. Mellanby, of St. Thomas's Hospital, had kindly consented to carry out the chemical tests for me. I thought that for the experiment to be of any value, a pharmacist of unquestionable authority must do these. I sent the amputated limb straight to him. He made extracts from the tissues of the foot from several places at varying depths, from the subcutaneous fascia down to the tarsal joints. He assured me that he had employed very delicate tests, which would have shown the slightest presence of salicylic acid, but that they were absolutely negative. The significance of this experiment was enhanced by the fact that the circulation was extremely sluggish, and had any appreciable quantity of salicylic acid been conveyed to the tissues there was less chance than usual of its being carried away."

If further proof be required of the falsity of this theory, it is to be found in the experiments brought forward by its supporters in proof of their contention, as, for instance, in the case of the alleged electrical introduction of strychnine into the tissues of rabbits, and their subsequent death from strychnine poisoning. The only possible explanation of this occurrence is that the strychnine, when introduced into the subcutaneous tissues as a strychnine ion, there loses its electrical charge, and is from thence carried by the blood-stream as a strychnine atom to the spinal centres, where it exercises its lethal action. If it were carried as an ion in the direction in which the illustrations of the experiment indicate, its action would not be concentrated on the spinal cord.

Likewise, when "ionizing" the joint with iodine, the detection of the iodine atom in the urine does not indicate the presence of the iodine ion in the knee-joint.

The foregoing arguments and experiments show that it is impossible to introduce drugs deeply into the human tissues by means of the galvanic current, and to obtain their specific action in those parts, but the contrary theory has been so widely held and taught that no excuse is needed for dealing with it at some length.

It is true that drugs, electrically introduced in an ionic state into the

subcutaneous tissues, may be thence absorbed in a nascent state into the general circulation as chemically active atoms, and may then exercise their specific action on the system generally. There is, however, no reason to suppose that the possible slight increase in efficiency of this practice over that obtained by the method of inunction is sufficient to compensate for its more complicated technique. Certainly no evidence is forthcoming to show that "ionic medication" with such drugs as the iodides, salicylates, &c., has anything to recommend its adoption in preference to the customary method of oral administration.

Moreover, there is no evidence of electrolytic dissociation occurring except in the neighbourhood of the electrodes, and there is nothing to support the claim of Leduc that "one of the most constant actions of electrolytic treatment is the resolving action on sclerosis and cicatricial formation of a kathodal stream of a solution of chloride of sodium," except so far as this takes place in contact with the poles. Further, the claim that "ionic medication" modifies "the chemical constitution of parts of the body, such as joints, fibrous tissue or nerves, by the setting up of chemical interchanges throughout their substance" is in direct opposition to experimental facts.

To what then are due the benefits which undoubtedly result from a prolonged passage of a strong continuous current through the tissues? In order to answer this question satisfactorily the theory adopted should show:—

- (1) That the electrical current produces a certain effect.
- (2) That this effect is such as is likely to result in benefit in those cases for which an improvement from a prolonged administration of a strong galvanic current is claimed.
- (3) That the prolonged administration of a continuous current of high intensity is followed by such an improvement in the affected part as would be explained by the alleged action of the continuous current.

The theory which I propound is that the beneficial effects resulting from the passage of a continuous current through the tissues of the human body, are *mainly* due to the heat generated in the tissues by the passage of the current, and the increased circulation and nutrition in the affected part which results from this increase of temperature.

- (1) That an appreciable increase of temperature would be generated in a limb by the passage along it of a current of 100 ma. for thirty or forty minutes would be foretold by any physicist. That such an increase of temperature does actually occur can be confirmed by any electro-therapist, when treating a case of sciatica by a continuous current of high intensity longitudinally applied along the length of the limb; for, if, towards the end of the treatment, he applies the palm of his hand to the knee of the treated side, he will find that it is perceptibly warmer than the knee on the other side.

In order to obtain objective, in place of subjective evidence on this point, I have performed the following clinical experiments.

My method for the treatment of sciatica by the continuous current consists in applying the negative pad, about 10 in. square, to the sacro-iliac articulation on the affected side, and a positive pad round the foot, ankle, and lower third of the leg. The pads are soaked with a weak solution of sodium chloride, and a current as strong as the patient will tolerate is passed for forty minutes. A current strength of from 80 to 110 ma. is usually reached by the end of the treatment.

In order to find the increase in the skin temperature resulting from this

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method, I attached a surface thermometer to the skin by means of a rubber strap a quarter of an inch above and to the outer side of the patella. As the result of over twenty experiments of this kind, I find that the skin temperature in these cases usually rises from 2 to 4° F., varying with the intensity of the current and the duration of the treatment.

The following is a typical case:—

Mrs. G. Sciatica of right leg. Pads arranged and treatment administered by continuous current as above described.

Time in minutes	Temperature of affected leg Degrees Fahrenheit			Milliamperes
0	Temperature shaken to zero	0
5	—
10	89.0	20
15	90.0	30
20	91.0	50
25	91.6	60
30	91.8	70
35	92.0	80

The diathermy current in this case was then applied with the following result:—

5	...	...	94.2	...	700
10	...	...	98.4	...	900

The following control experiment was taken on the sound leg:—

0	...	...	Zero
5	...	...	91.0
10	...	...	91.0
15	...	...	91.0

The control on the sound side shows that the thermometer employed reached its correct reading in five minutes. In taking the temperatures in these cases of sciatica, I have usually found that the skin temperature on the affected side is about 2° F. lower than on the sound side, before the treatment is applied.

I found that the ohmic resistance of a man's leg with the pads arranged in the way described was at the end of a treatment 500 ohms.

The equation, in accordance with Joule's law: $1^2 R T \times 0.24$, would be 0.01 amp., 500 ohms., 2,400 sec. $\times 0.21 = 2,880$ calories. Thus a considerable amount of heat is generated in a leg treated in this manner for forty minutes (2,400 seconds) with a current of 100 ma. This amount is, however, in excess of the amount usually obtained, as the current intensity of 100 ma. is not reached in the early part of the treatment.

(2) How does this theory of the increased production of heat in the deeper structures and through the entire length of a limb or part of the body, explain the beneficial effects of this form of treatment and indicate its adoption in, for instance, that vast field of medicine included under the modern title of "Fibrositis"?

Let us accept the theory that this condition is due to a toxæmia caused by some bacterial infection, though the bacteriologists are by no means agreed, either in regard to the type of bacteria, or to the method of infection.

Now, most medical men will admit that this toxæmia only becomes active and produces the symptoms characteristic of fibrositis, when the vitality of the patient or the part affected becomes lowered, either by strain, accident, worry, damp, over-fatigue, or other exhausting cause. It will, moreover, generally be found that the affected part in chronic cases is colder and has a feebler circulation than normal, and it is well-known that fibrositis becomes more

common as the resisting powers of the patient diminish with advancing years. As Hanot puts it, "Tout ce qui affaiblit prédispose."

We claim that the continuous current, by its raising the temperature of the limb or part of the body in the way I have indicated, and by the increased blood supply which results from the increase of temperature, follows the lines of treatment indicated by the conditions mentioned. Moreover, we claim that the increased vitality and nutrition of the tissues, thus excited, tend both to cure the disease and to guard against its recurrence.

(3) To illustrate the effects of prolonged treatment by the continuous current, let us take the case of rheumatoid arthritis of the knee-joint. This joint lends itself better than any other to the concentrated action of intensive galvanism, and, in my experience, yields better results from electrical treatment than any other joint. Such a joint before treatment is swollen, thickened, painful, tender, fixed or limited in its range of movement, the skin is glossy and denuded of hair, and the patient is unable to walk. After a period of treatment, varying from a fortnight to six months, according to the severity and duration of the complaint, the pain has ceased, the thickening has decreased and the joint is far less swollen, it is more free, and in some cases has fully regained its mobility; the skin has regained its normal texture, there is perhaps even an overgrowth of hair on the part; and finally the patient is able to walk.

Such are the results, I submit, that we should expect from the increased blood supply resulting from the application of the galvanic current. If the resulting reduction in swelling and thickening were due to an electrolytic action, we should reasonably expect, at any rate, a temporary increase of pain and inflammation. On the contrary, we find that one of the first benefits obtained is a decrease of pain, and this may be explained by the relaxation of tension resulting from the increase of the temperature of the joint.

We thus see that a considerable increase in temperature results in a limb treated by intensive galvanism. Such an increase in temperature leads to an increased blood supply. The beneficial results produced are such as would be expected from increased nutrition and increased cellular activity consequent upon an increase in the blood supply of the affected part.

It may be urged that if the generation of heat within the tissues is so beneficial, it would be better to utilize the more powerful heat-producing action of the diathermy current. But it does not necessarily follow that because a method of raising the heat of a part to its normal, or even slightly above its normal temperature, is good, it is therefore advisable to raise its temperature to fever heat. Practical experience shows that the two currents, the continuous galvanic and the oscillating diathermic currents, have each their sphere of action. In old standing chronic conditions, in which the local circulation and nutrition need improvement, the best results are obtained from the galvanic current, but acutely painful conditions, especially those attended with spasm, yield most readily and quickly to the more intense heat of diathermy, which rapidly relaxes the spasm and hence relieves the pain.

But does the continuous current in its interpolar course between the electrodes produce no effects other than those of heat? Has the bombardment of the cell constituents by millions of ions, with a force capable in the aggregate of producing an appreciable degree of heat, no stimulating effect on the activity of the cells themselves? It seems reasonable to suppose that this "ionic massage" must have some such effect. It is a difficult matter to

prove, and I would prefer to base the therapeutic claims of the galvanic current upon the surer and more evident basis of heat production. In this connexion Professor Soddy propounds an interesting question in his book, "Matter and Energy:" "Have the minute cells of the body the power of taking advantage of the difference in the temperature of the molecules bombarding them, and when one comes along at more than the average speed, absorbing it and its energy, building up a larger cell thereby, which in course of time undergoes metabolism and evolves again its store of energy?" This is, as Professor Soddy states, a fascinating and legitimate line of inquiry, but it is an enigma a solution of which I will not attempt to offer.

Hitherto we have been solely discussing the interpolar action of the continuous current, but there is little doubt that the polar action of the continuous current at the pads is of considerable importance, especially in increasing the blood supply and the nutrition of the skin in chronic cases. This polar action may contribute in no small degree to the continuous current being more beneficial in chronic cases than the diathermy current, for the latter has, of course, no polar action.

In the typical case of rheumatoid arthritis which I quoted above the trophic improvement in the condition of the skin is probably almost entirely due to this polar action of the current.

It is important to realize that the polar action of the galvanic current is of two kinds, the one a primary or direct action, the other a secondary or indirect action.

The primary or direct action is due to the direct destruction, dissociation, or splitting up of the tissues, in contact with the poles, by electrolysis. The secondary, or indirect effects result from the action of the products of this decomposition on the tissues. Thus with non-polarizable electrodes, such as platinum, an acid will be formed at the positive pole, and an alkali at the negative, as is seen in the litmus paper test for polarity. With polarizable electrodes, such as zinc, a salt, in this case the oxychloride of zinc, will be formed in a nascent state at the positive pole. With a sufficient strength of current the chemical action of these products on the tissues in the neighbourhood of the poles is a very important one.

In treating cases by what we may term medical galvanism, these two actions are avoided as much as possible by the employment of currents of low density, otherwise serious burns of the skin would result. But there is always some irritation of the skin caused by the electrolysis at the poles of the substances which are employed to moisten the pads, and within certain limits the action of these products is beneficial in stimulating the blood vessels of the skin, both directly and reflexly, and so producing an increased blood supply of the surface with its attendant benefits.

From the foregoing reasoning, based upon experience and experiments, we arrive at the conclusion that the continuous current, through the chemical changes which it excites at the pads, both directly and reflexly stimulates an increased blood supply of the skin, and by the increased heat-production in the tissues an increased blood supply results throughout the whole of the interpolar path, inducing nutritional and other therapeutic effects of the greatest value and importance. Moreover, there is reason to suppose, though the proof is not forthcoming, that the bombardment of the tissue cells by millions of ions in the path of the current must occasion an increase in the functional activity of those cells.

THE SURGICAL APPLICATION AND ACTION OF THE CONTINUOUS CURRENT.

The polar action of the continuous current is discussed above solely in relation to its medical application; in surgical treatment both the direct electrolytic effects of the current and the action of the nascent products of this electrolysis are of great importance.

By inserting a negative electrode, in the form of a fine platinum needle, into a hair follicle, the roots of superfluous hairs can be electrolysed, the follicle destroyed and the hair epilated. This process is in the main an electrolytic one, though it is true that a caustic alkali is also formed in the neighbourhood of the electrode, and doubtless assists in the destructive process.

A somewhat similar method is very useful in the treatment of septic sinuses. A zinc probe is passed into the sinus and attached to the positive pole of the battery. In this case, some electrolysis of the tissues occurs, but the more important action is that of the nascent oxychloride of zinc, the product of the electrolysis, which exercises both a destructive and an anti-septic action on the lining membrane of the sinus. Lupus nodules may be successfully treated in similar manner by the introduction of a zinc needle and the application of 3 or 4 ma. for a few minutes.

Another application of this treatment supplies us with one of the most valuable methods in the whole range of electro-therapy. In cases of chronic endometritis with a septic discharge, a uterine probe of zinc is introduced into the uterus, connected with the positive pole of the battery, and a current of 20 to 30 ma. is passed for fifteen or twenty minutes. No anæsthetic is needed. Any slight pain that may be caused can be allayed by a reduction in the strength of the current. In this case the nascent oxychloride of zinc pervades the whole surface of the mucous membrane, permeating to every crypt and follicle, thus destroying it more intimately and completely than can be done by the most thorough curetting. How much better are nature's arrangements than those suggested by some electro-therapists, for were the theory of deep "ionic medication" true, the whole body of the uterus would be destroyed by the action of the zinc ions.

I am convinced, both by my experience of this treatment and from my past experience of curetting—an operation which I often performed when engaged in general practice—that the electrical method should invariably be preferred, except in those cases where there is reason to expect the presence of placental remains.

The same method can be successfully adopted in the treatment of some cases of metrorrhagia; in such cases it is advisable to use a copper probe in place of a zinc probe, on account of the more styptic action of the oxychloride of copper.

The hyperplasia of the uterine mucous membrane is thus destroyed, and a cure effected in uncomplicated cases. I have known similar treatment successful in a case of recurrent miscarriage, the patient had several times been curetted on account of this trouble without any benefit, and had taken every precaution to prevent the recurrence of the abortion, but without effect. She took no unusual precaution during the next pregnancy after the electrical treatment, and a healthy child was born at full term. The only explanation that I can offer for the success of the treatment, after the repeated failure of curetting, is that a diseased condition of the uterine mucous membrane had been more thoroughly removed.

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Attempts have been made by writers on "ionic medication" to show by test-tube experiments that this polar action is the result of the electrical introduction of ions. A careful examination of these experiments will show that the alleged "ionic" action ceases at the interposition of any medium of a different character to that of the solution in contact with the active electrode, and the real facts revealed by these experiments show that the action is solely polar, namely, that it results from direct electrolytic action and from the action of the products resulting from the electrolytic action that occurs at the poles.

I would urge in conclusion that, if electro-therapy is to be placed upon a scientific basis, the "theory of ionic medication" should be relegated to the myths of the past; and that the misleading and misconceived term "ionization," as applied in this connexion, should be replaced by the simple term "galvanism;" or if one wishes to imply the employment of the continuous current to its full therapeutic extent, the term "intensive galvanism" might be suitably substituted.

DISCUSSION.

Dr. E. P. CUMBERBATCH said that it was somewhat difficult to refrain from destructive criticism of the views expressed in the paper they had just heard, for although the therapeutic results were undoubted and obtained by well known methods, the explanation of the way in which they were brought about was based on insufficient evidence. There was abundant experimental evidence to show that ions could be made to pass through the skin and for a short distance below. Dr. Finzi had shown that ferrocyanide ions could be made to penetrate the skin of a monkey and enter the cartilage of the knee-joint. Gantier had demonstrated that copper ions could be made to pass through the uterus of a rabbit and stain the outer surface a green colour. Many other experiments had been performed by others, proving that ions could be made to penetrate through and below the skin or mucous membrane. When inert ions, such as those of chlorine and sodium, were introduced by the galvanic current, instead of ions possessing germicidal properties, chronic septic ulcers could, in some cases, be made to heal. The mode of action of the current here was not certainly known. Organisms in suspension migrated to the anode where they were destroyed, but the ulcer could sometimes be made to heal when the current flowed in the opposite direction. The caustic chemical bodies formed at the anode and kathode did not diffuse deep enough nor quickly enough to destroy organisms below the surface. Most workers were of the opinion that ions could not be made to penetrate far below the surface. An ion could not penetrate far below the surface without meeting a lymphatic or blood-vessel, and when it penetrated the wall of the vessel, it was carried away by the circulating fluids. They needed a satisfactory explanation of the way in which the galvanic current passed through the skin and underlying tissues, could relieve the pain due, e.g., to an inflamed sciatic nerve. Dr. Turrell had suggested one explanation, that the result was due to heat. The table which he had exhibited showed that the temperature of the limb rose after the galvanic current had passed for some time. This was a possible explanation. But it seemed to him (Dr. Cumberbatch) that the heat was not generated by the current according to the principle enunciated by Joule's law, but was due rather to vaso-dilatation and to the inflow of a larger supply of blood. The rises of temperature shown in Dr. Turrell's experiments were only slight and in no case above normal. The currents which he used did not seem to have been strong enough to *generate* a measurable degree of heat, particularly in vascular parts. In his (Dr. Cumberbatch's) experience a diathermy current directed along the lower limb, its intensity being sufficient to produce a slight rise of temperature or a rise a few degrees above normal, was seldom effective in relieving the pain of sciatica, and he had long ago abandoned this method of applying diathermy for this disease. He was unable to offer any explanation that was other than an hypothesis of the way in which the galvanic current relieved the pain in regions

which lay beyond the distance to which ions could penetrate. Irritants applied to the skin (blisters, cups, setons, &c.) were in some cases capable of relieving pain in deep-seated parts; surface heating and surface cooling had the same power. These physical agents acted presumably in a reflex manner, through the nervous system, and it was possible that the galvanic current, in its passage through the skin produced effects *reflexly* in the parts below the surface beyond the range of direct action of the agents applied to the surface. The current was able to modify the excitability of nerves, and it might be that effects akin to electrotonus were produced in the sensory nerve terminations in and just below the stratified squamous epithelium. Under the anode the depression of the function of the nerve endings was likely to produce the same effects as sedative agents such as heat. Under the kathode the reverse effects were produced, and they had the same kind of action as cutaneous irritants. Pure anelectrotonus and katelectrotonus could not be obtained in the nerve *trunks* of the human subject, but in the nerve terminations in and below the epithelium they could probably be produced in a relatively high degree of purity. As far as he was aware, no experimental work had been done on electrotonus, in which the electrodes had been permeated with ions possessing therapeutic powers instead of chlorine and sodium ions. The results which could be obtained from such work might afford a clue to the mode of action of the galvanic current in regard to its power to relieve pain caused by disease of deep-lying parts.

Dr. N. S. FINZI said that his criticism must be destructive in order to combat views which were so retrogressive, and to which weight would attach on account of the eminence of the author who expressed them. A good many years ago he (Dr. Finzi) had performed a large number of experiments on animals to test the path of ions introduced through the skin. The animals used had been cats, rabbits and a monkey. The ions experimented with were ferricyanide, ferrocyanide, sulphide and hydroxyl, ferric, ferrous, zinc, copper, mercuric, calcium and hydrogen. He had found that the results with the various ions were very different. The ferricyanide and ferrocyanide, ferrous, ferric and cupric ions had been easily traceable by suitable staining fixatives. The two first had penetrated the skin readily and it had been found that although large quantities were taken up by the capillaries quite a large amount passed the capillaries and penetrated the muscles, especially when large currents or long exposures were used. These ions had been seen entering by the lymph spaces. With ferric ions quite a different result had been obtained as they were all deposited in the epidermal layers, not even reaching the corium unless there was an abrasion of the skin. Copper ions had given precisely the same result. Ferrous ions on the other hand had penetrated readily and had given a result similar to ferro- and ferricyanide with the exception that a larger amount was deposited in the epidermis, probably owing to some ferric ions being present as impurity. Calcium ions had been deposited in and beneath the corium, only a small quantity, however, going through the corium even when a large current was passed for a long time. The attempt to demonstrate zinc ions had failed. From the macroscopic appearances they probably behaved like calcium ions. He would describe another experiment in detail. A monkey had been anesthetized, and a pad soaked in potassium ferriyanide had been placed over the front of its knee, the area which the solution touched being limited by a window cut in a piece of oil-silk. The pad had been connected to the negative pole and a current of 10 ma. passed for thirty minutes. The knee had then been removed by rapidly cutting through the thigh and leg and immediately placed in a solution of ferrous sulphate. A control experiment had been performed under the same conditions with the exception that no current was passed. In the knee in which the current was used it had been found that the skin, subcutaneous tissues and patellar tendon over which the window had been placed were stained an intense blue from the interaction of the ferriyanide ions and ferrous sulphate. Moreover this stained patch extended right into the joint, there being a localized stained patch on the cartilage of the femur extending right down to the bone. In the control the blue had not even penetrated the skin. This proved that it was possible to introduce ions of some substances directly into a joint, at any rate into a superficial joint like the knee. He agreed with Dr. Cumberbatch that the local heating was probably due to engorgement of vessels. Most of the actual heat produced by the current was removed

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by the blood circulation and dispersed in the ordinary way through the lungs, skin, &c. If the effect of galvanization were due to heat alone the same result would be produced by very weak diathermy, but it was admitted that this was not so. He thought Dr. Turrell was quite right in drawing attention to the factor of the current, as distinct from the driving in of ions, in curing disease. But Dr. Turrell had gone too far in not admitting that the ion used made any difference. He (Dr. Finzi) thought also that the effect of the current would be found to be due, not to the heat produced, but to the forced migration of ions contained in the body from one part to another.

Dr. TURRELL (in reply) said that the experiments to prove the electrical introduction of the ferricyanide ions into the knee-joint of the monkey should be entirely disregarded; because, after the ferricyanide had been electrically introduced into the superficial layers of the skin, the knee-joint of the rabbit, so treated, was allowed to soak in the reagent for more than twenty-four hours before the presence of the ferricyanide in the joint was looked for; thus admitting a very simple explanation of the phenomenon, namely, by the diffusion that we should expect to occur under such conditions. Electrotonus was a laboratory experiment conducted on isolated nerves through which a definite and known amount of current was passed; such an experiment had little or no bearing on galvanic treatment, in which the amount of current passing along the nerve-trunks must be exceedingly small. The skin temperature of the treated limb was taken 4 in. or 5 in. above the upper limit of the lower pad, its elevation was not therefore due to vasomotor effects in the skin arising from the polar action of the current; certainly an increased blood-supply resulted in the whole limb, but this was due to the heat generated by the passage of the current. The normal surface temperature of the skin, as recorded by the thermometer employed, was 91° F., the tables given thus showed that a temperature above the normal was excited by both the galvanic and the diathermic currents. If it was "retrogressive" to explode fallacies which had existed since 1747, when the fallacious theory of ionic medication was first introduced by Verratti, then it must certainly be admitted that the views expressed in the paper were retrogressive.

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Section of Epidemiology and State Medicine.

President—Dr. A. K. CHALMERS.

PRESIDENT'S ADDRESS:¹

The Function of the Isolation Hospital in a General Scheme of Hospital Provision.

By A. K. CHALMERS, M.D. (President).

(Medical Officer of Health, Glasgow.)

AT a time when the hospital provision of the country is under review, it may serve a useful purpose to consider where the Isolation Hospital stands in relation to any scheme for providing institutional treatment for sickness when home facilities prove inadequate for the purpose. It isolates and also treats disease, and in the discharge of these combined functions may be said to occupy a unique place among hospitals.

As a place of isolation the purpose is to prevent the spread of disease; as a place of treatment the patient's relation to spread becomes secondary; and the main purpose is to place him in surroundings better adapted than those of his home to promote recovery. In the one case it is the physical surroundings of the patient, in the other the economic status of his household, and its ability to provide adequate means of treatment which determines removal.

With regard to many diseases, and especially with regard to those which were formerly included within the group of major infections, this distinction is unnecessary, for the patient is usually as the law phrases it "without proper lodging and accommodation," and removal for isolation and for treatment are alike necessary, and for the same reason.

¹ At a meeting of the Section, held October 29, 1920.

All this is, of course, elementary, but it seems desirable to keep it in view, for the argument may reasonably proceed beyond the preventive aspect of isolation, and regard the need for institutional accommodation for treatment as the dominant element in considering the question of removal. In this sense the Isolation Hospital would fall into line with others, and become a unit, for the treatment of diseases of a particular class, in a general scheme of hospital provision.

The difference in action thus suggested finds its parallel in that which exists between the conditions which form the staging of infectious disease to-day, and those which existed when our Isolation Hospital policy—if such it may be called—was in process of formation. The sanitary circumstances of the earlier period favoured mass attacks of infectious disease in dimensions which have no modern equivalent, in this country at least, save in the recent pandemic of influenza. Now it was cholera—actual or threatened—again it was typhus fever, small-pox, or relapsing fever, more rarely scarlet fever. Mainly it was diseases of the old principal zymotic group; the infectious diseases of childhood had little place.

But the movement which ultimately shaped the policy took origin in definite local need, and it may well happen that in the growing maze of customs, by which our Isolation Hospital policy is becoming surrounded, the essentially local factors which determine action are apt to be forgotten.

A stranger to our customs may, in any volume on the subject, read that a Local Authority may, but if required shall, provide hospital accommodation for infectious disease. The principle is clearly expressed, but should he inquire further as to its application in the practice of the several responsible authorities he would find such differences as we know to exist both with regard to the diseases dealt with, and the proportion removed to hospital; and these differences bring us back to the original question of local need.

THE ORIGIN OF THE MOVEMENT.

The Pest-house of the eighteenth century gave place to the Infectious Diseases Hospital of the nineteenth, and the accumulating experience of Local Authorities gradually became crystallized in successive Acts of Parliament, which made their provision a statutory obligation. For fully half a century local experience and legislative authority have combined in regarding the provision of isolation hospital accommodation

as essential to the general purpose for which Sanitary Authorities were created—in other words, for the prevention of disease.

When Sir Richard Thorne reviewed the position in the early eighties,¹ the number of authorities which had provided, or had access to, isolation accommodation formed barely one-fifth of the total (296 out of 1,593).² Thirty years later Dr. Franklin Parsons returned to the subject³ and describes the intervening period as one "during which the provision and use of isolation hospitals had become more general," but does not give numbers. He cites the steady reduction in the death-rates from enteric and scarlet fevers during the period, these being diseases in which isolation was largely practised, and compares them with the more refractory death-rates of measles and whooping-cough which are less frequently treated in hospital. Twenty-one years of notification gave him an opportunity of showing for scarlet fever in London a reducing attack-rate, death-rate, and case mortality, corresponding in time with a steady advance in the proportion of cases isolated in hospital, so that while in 1890 it had been almost 43 per cent., in 1910 it approached 86 per cent., and in the preceding year had reached 90 per cent. But he is careful to enter a caveat for the consideration of other factors. Scarlet fever is becoming milder in type—the diminished mortality is not confined to districts removing the larger proportion of its cases,⁴ and with regard to London there is some uncertainty as to whether a change in the percentage of population under 10 years of age had taken place. Again he reminds us that, while enteric fever was decreasing in prevalence, there had been much collateral activity in what may be termed collectively "sanitary improvements."

The evolution of a hospital policy has, I think, been nowhere better described than in the address which my predecessor, Dr. J. B. Russell, delivered to the Epidemiological Society in the Session 1881-2.⁵

¹ "Report on the Use and Influence of Hospitals for Infectious Diseases," Supplement to the Tenth Annual Report of the Local Government Board, 1882.

² In 1915 these figures had risen to 1,034 out of 1,807, excluding tuberculosis sanatoria and hospitals. See "Return of Hospital Accommodation in England and Wales," by Local Government Board. Some of the remaining authorities had access to existing hospitals.

³ "Report on Isolation Hospitals," Supplement to Local Government Board Report, 1910-1911.

⁴ See also report on "The Natural History of Scarlet Fever," published February, 1897; Supplement to *Public Health*, by Dr. J. T. Wilson, County Medical Officer of Lanarkshire.

⁵ "The Policy and Practice of Glasgow in the Management of Infectious Disease," *Trans. Epid. Soc. Lond.*, n.s. (1881-82), 1883, i, pp. 68-95.

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To a complex of bodies largely voluntary and to a considerable extent dependent on contributions from the charitably disposed, dealing as best they could with epidemics as they arose, and frankly critical of each other's responsibilities when the emergency had passed, "the injustice and inefficiency of the policy of using charitable organizations for the suppression of epidemics" gradually became apparent, and in time led to the adoption of a policy which declared that all duties affecting the management of infectious disease should be discharged by the Municipal Authority.

To return to the extent of isolation accommodation now available, two useful returns are available. In 1915 the Local Government Board (England) issued a return showing the hospital accommodation in England and Wales, and in 1920 the Board of Health, in Scotland, issued a Report on the Hospital and Nursing Services which had been prepared by the National Health (Insurance) Commission (Scotland) for 1914 and 1917. In detail they differ, but the extent of provision is comparable. In England and Wales, excluding 420 beds for Port Local Authority purposes, the combined fever and small-pox accommodation is equal to one bed per 947 of the population; in Scotland it is one bed per 770. This is equal to eleven and thirteen beds per 10,000 of their respective populations. Whether this ratio is adequate we need not here consider. Adequate provision depends as much on accessibility as on numbers. It is essential, however, to ascertain the purpose that lay behind their provision and interestingly enough we find the pest-house also known as the "House of Recovery." I quote from Sir George Buchanan who also says: "The original design of these hospitals was to promote the recovery of the individual poor patient for whom other accommodation was wanting." But he also adds, "From a very early period of their history, infectious disease hospitals have been advocated on the ground of their protecting the household against the spread of infection." We get here an indication both of the conditions which determined removal, and of its purpose in these early days.

REASONS FOR REMOVAL.

Adequacy of accommodation for home treatment cannot be standardized although it assumes the existence of a standard. It varies with the conditions, and must be interpreted in their presence. The legal phrase is "without proper lodging and accommodation" and a reasonable interpretation of this, for clinical, I think, as well as for

preventive purposes, is a room in which the patient and his attendants will be completely detached from the family life.

With housing in tenements, as we understand the term in Scotland, this is difficult to get, and the proportion of some diseases isolated in hospital is correspondingly high. In 1918, 93 per cent. of the cases of enteric fever occurring in our towns or burghs, and 85 per cent. of those occurring in our rural or landward areas, were removed to hospital; 87 and 80 per cent. of scarlet fever; 91 and 83 per cent. of diphtheria.

I have selected these three diseases as affording indication of our effort in Scotland to reach a standard of removal for preventive purposes of the diseases which supply the bulk of isolation hospital cases in ordinary times. In typhus, small-pox, and the exotics which occasionally reach us by shipping, removals to hospital would include every known case.

But, if we are to interpret liberally the requirement to provide adequate facilities for treatment which a general scheme of hospital provision implies, measles and whooping-cough, among others, at once claim attention. In measles particularly, the preventive value of hospital isolation is at its minimum, and the risk of infectious bronchopneumonia developing in a hospital ward considerable, but if the standard of a room for the patient, and the necessity for treatment which so often arises, are to be observed the provision of hospital accommodation will require to be considerably increased especially in our densely packed communities.

We must bear in mind, of course, that the diseases originally dealt with were of the major epidemic group. The infectious diseases of childhood obtained recognition only at a later period, and even to-day local practice with regard to them differs widely.

THE PREVENTIVE ASPECT OF HOSPITAL ISOLATION.

In the multiple sanitary activities of the closing quarter of last century there was difficulty in disengaging the part played by hospital isolation from the result of other measures directed against the reduction of disease generally. Rigorous enforcement of regulations against over-crowding and the removal of every recognized case of the disease to hospital has a time relation at least with the elimination of typhus fever. Improved water supplies, sewerage, and dairy regulations coincided with an increasing rate of removal to hospital of enteric fever and a reduction of its prevalence. So long as death-rates were falling,

and there was no way of measuring sickness or attack-rates, a reducing case-mortality might suggest modification in type, to which Dr. Parsons refers, or alternatively, the elimination of mixed infection which so often gave malignancy to the principal disease as in the septic form of scarlet fever. This again was referred back to the improved domestic conditions which other activities had produced, but it left the issue obscure as between the preventive value of isolation, and the domestic cleansings which accompanied it.

In view of the grouping of secondary cases which so often occur among the contacts with infectious disease when its nature is unrecognized, it was a reasonable assumption that prompt recognition and isolation by removal or otherwise, with such supplementary measures for dealing with the area of infection as circumstances suggested, would in time influence the prevalence of disease by reducing the centres of infection. The Royal Commission on the Fever and Small-pox Hospitals of London (1882) clearly held this view. "We are led," they say, "by the concurrent evidence of several experienced witnesses to hope that the immediate and complete isolation which ought to be secured by these means (notification and isolation) will greatly diminish the amount of small-pox, scarlet fever, and typhus in London."

Sir Richard Thorne, reporting on an inquiry into scarlet fever in England about the same period, wrote: "These districts, where the largest proportion of attacks was isolated, *in so far as attacks can be judged of by total mortality*, were those in which some early information was procurable as to the occurrence of the several attacks."

My predecessor reviewing the question in Glasgow in 1883¹ put the views of the period very clearly. "The evidence of the success of prevention, in so far as isolation is concerned, is, and may be formulated as an increasing proportion isolated of a diminishing total quantity of infectious disease existing. The acme of success will be the largest proportion isolated of the smallest quantity of disease existing."

The uncertain character of the data on which these views were based must be remembered. Already death-rates were falling, but whether due to modification of type, or to reduction in prevalence was largely uncertain. An increasing proportion of the deaths from special diseases was occurring in hospital, but estimates of prevalence could be little better than a happy guess at the number of cases

¹ "Memorandum on Hospital Accommodation in Glasgow," 1883.

treated at home, among which the deaths not in hospital occurred. When Dr. Parsons reported he was able to review the attack-rate of scarlet fever in Nottingham from 1882, and in London for the years 1890-1910. In London a steady increase in the rate of isolation was associated with a decrease in attack-rate and case mortality. In Nottingham fluctuations had occurred with which he deals.

But the history of infectious disease in selected communities is necessarily incomplete without a knowledge of the contemporary records it is tracing elsewhere, and until the Notification Act was uniformly in operation such knowledge was not available.

The Notification Act has been in operation over the whole of Scotland since the passing of the Public Health Act, 1897, and in England since 1899. Case-rates for the chief acute infectious diseases are now published for England and Wales¹ from 1911 onwards; in the Annual Reports of the Local Government Board for Scotland since 1898 the numbers notified and removed to hospital are given. Material is thus accumulating on a considerable scale, and with a direct bearing on the purposes for which the Epidemiological Society was founded.²

In this summary of the position antecedent to notification, I have had in view the opportunity of submitting for your consideration some aspects of its operation as illustrated by our experience in Scotland. As a prelude let me formulate a few generalizations:—

(1) The development of hospital isolation has been contemporaneous with improvement in the general conditions and surroundings of life among civilian populations which have tended, on the one hand, to reduce domestic overcrowding and proximity to the sick, and on the other towards limiting the spread of infection through the medium of food and water, and otherwise.

(2) The reduction in the general death-rate has been very largely exceeded by that from infectious diseases and diseases of the lungs—including phthisis. In Scotland, for example, between 1870 and 1910, while the general death-rate fell by 23 per cent., that from lung diseases was reduced by 36 per cent., and from infectious diseases by 63 per cent. But the death-rate from particular diseases have by no means followed the group amongst which they are included: among the commoner

¹ "Report on Public Health and Medical Subjects (No. 2)," Ministry of Health, 1920.

² "To institute a rigid examination into the causes and conditions which influence the origin, propagation, mitigation, prevention, and treatment of epidemic diseases," "Essays on State Medicine" (Rumsey), p. 133.

illustrations, measles and whooping-cough, for example, have not shared to an equal extent in the general decrease of the infectious disease group; pneumonia, among lung diseases, has definitely increased. The suggestion is that some factor not hitherto reached by general sanitation is here in question.

(3) While the law regarding the provision of hospital accommodation is uniform its local application varies within wide limits. What reasons determine local practice in removal? Is it the average size of house and consequent facilities for home isolation, together with the ability of the family to provide home treatment?

(4) What is the purpose of isolation? Is it to return the convalescent to the ranks of civil life in a non-infectious condition, or as completely restored to health?

(5) Does treatment end with the termination of the infective period? Is there any "following up" of disabled convalescents from damaged heart, kidneys, or ears, especially in scarlet fever?¹

NOTIFICATION IN SCOTLAND.

The Notification Act was made applicable throughout Scotland in 1897, and its results are available since 1898.² Information is given separately for the Counties (rural and landward areas) and Burghs, so that we may consider the prevalence of special diseases from the point of view of the proportion isolated for about twenty years.

Enteric fever (Chart No. 1) presents the relationship in its simplest form. Many Local Authorities had adopted the Act before it became compulsory, so that already in 1898 the County areas were removing one-half, and the Burghs two-thirds of the notified cases. In 1918 (the last years for which the returns are available) the Counties were removing 85 per cent. to hospital, and the Burghs 93 per cent. Coincidentally, the case-rate per million had fallen in the Counties from 1,064 in 1901 to 434 in 1911, and 176 in 1918; while in the same years the Burgh attack-rates were 1,182, 337 and 142 respectively. There is a tempting contrast in the movement of these rates which I need not emphasize.

If we turn now to scarlet fever (Chart No. 2) the isolation-rate in

¹ Dr. Kerr Love informs me that during the six months ending November, 1916, 24 per cent. of the cases of middle-ear suppuration presenting themselves at the Glasgow School Clinics originated in measles, and 16 per cent. in scarlet fever.

² See Annual Reports, Board of Health.

Counties in 1898 was 34 per cent.; in 1918, 78 per cent.; the corresponding rates for the Burghs being 56 and 87. The proportions isolated in enteric and scarlet are fairly alike, but the movement in the attack-rates is widely different. Taking the two census years, the case-rates per million in the Counties were 4,212 and 3,871, and in the Burghs 4,003 and 4,276—a slightly lower rate for the Counties, a slightly greater one in the Burghs. In 1918 the rate in both fell again to a level which had been reached in 1905. The divergence of the curves showing isolation and attack-rate which we saw in enteric has not occurred in scarlet fever.

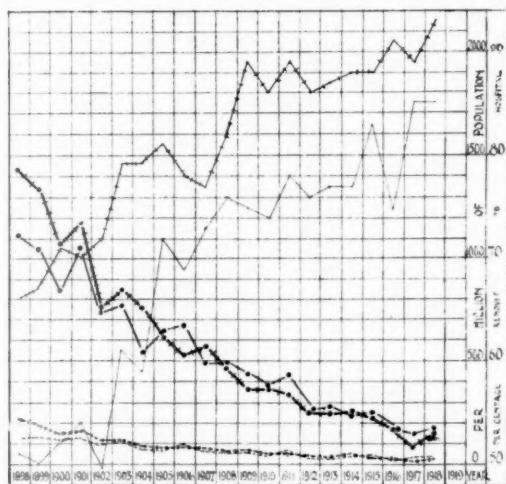


CHART 1.

Enteric fever. Case-rates, death-rates per million of population, and percentage of cases removed to hospital, in burghs and county districts in Scotland. Explanation of curves appears on Chart 2.

Diphtheria, including membranous croup (Chart No. 3), which is the third illustration I have selected, is probably the most suggestive. The isolation rate at the commencement of the period was considerably lower than in either enteric or scarlet fever, but it rose rapidly in both Burghs and Counties so that in recent years it has become fairly comparable with them. In 1898 the Counties were isolating 12 per cent., and the Burghs 37 per cent.; in 1911 these had risen to 61 and 77 per cent. But the attack-rate in the Counties rose from 759 per million in 1901 to 1,668 in 1911, while that in the Burghs rose from

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1,012 to 2,269. It is now at a lower level in both, but not so low as when the comparison began. For the greater part of the period the isolation-rate and the case-rate were moving in opposite directions, and this occurred "after half a century of what may be called intensive sanitary administration, and during a decade when the hospital isolation

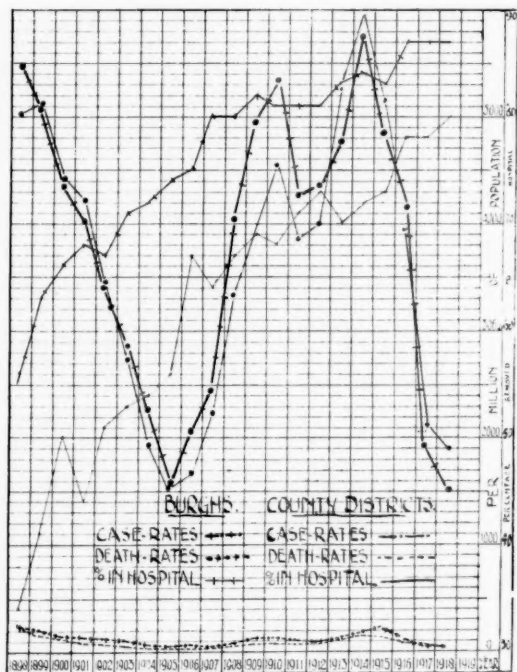


CHART 2.

Scarlet fever. Case-rates, death-rates per million of population, and percentage of cases removed to hospital in burghs and county districts in Scotland.

of recognized cases is being practised to an extent formerly unequalled."¹ Beginning in the middle of last decade a wave of diphtheria² swept

¹ "The increase of Diphtheria in Scotland in recent years" (Edinburgh Congress of Royal Institute of Public Health, 1914), *Journ. of State Med.*, 1916, xxiv, p. 349.

² This would seem to have been an extension of the prevalence in England during the later decades of last century and which was associated with a transference from rural to urban areas.

over Scotland—town and country alike—and was accompanied, there is some reason to think during the 1906-12 period at least, by an alteration in the age incidence of attack. At least the proportion of notifications at ages 5-15, and especially at ages 5-10, is greater, I think, than change in age-constitution would explain.

I have selected these three diseases because while they have a fairly comparable isolation-rate, their epidemiological features are frankly different. One declines, another moves in wide fluctuations, a third

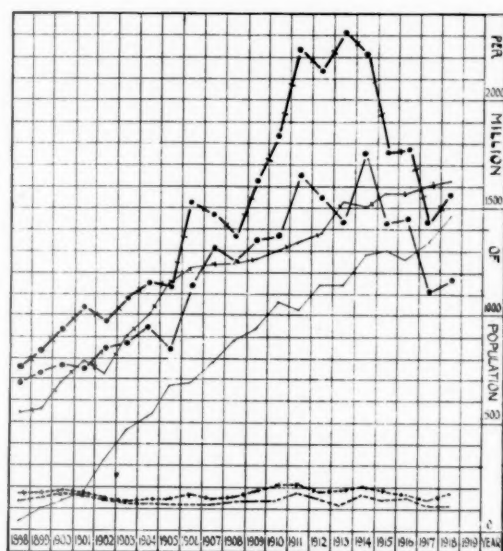


CHART 3.

Diphtheria. Case-rates, death-rates per million of population, and percentage of cases removed to hospital in burghs and county districts in Scotland. Explanation of curves appears on Chart 2.

definitely increases, despite a rapidly increasing rate of isolation common to all. What features in the natural history of scarlet fever and diphtheria are not met by isolation and such other preventive measures as have coincided with the reduction of enteric fever?

Before considering these I propose to submit some local figures which have the advantage of extending over nearly 30 years and include morbidity rates for the period.

Thirty Years of Notification in Glasgow (1891-1919).

Broadly speaking, the features of the Glasgow charts correspond with those of Scotland within the period when comparison is possible. But in the first decade of notification the enteric fever attack-rate almost doubled itself (Chart No. 4), being 884 per million in 1892, and 1,657 in 1898. This latter rate was repeated in 1901, after which it fell rapidly. For the last ten years the fall has been rapid and almost continuous, and in 1917 was only 82.

The rise in the attack-rate during the period 1892-98 is not wholly to be explained by a more rigid compliance with the requirements of the Notification Act, for the death-rate during 1881-90 averaged

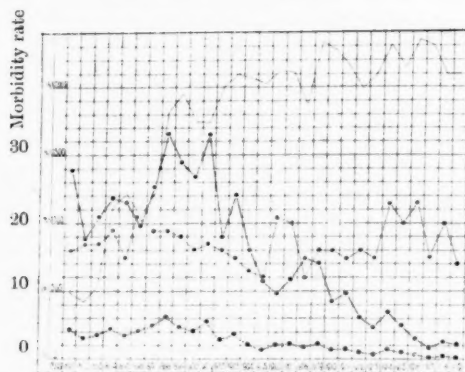


CHART 4.

Glasgow. Enteric fever, 1891-1919. Case-rates and death-rates per million.
 = Upper curve: Case-rate. — = Percentage of cases in hospital.
 - - - - = Death-rate. — = Lower curve: Morbidity rate.

230 per million, and during the first decade of notification 215. But the contrast which the attack-rate of these years presents with the fall during the twenty years which followed suggests, I think, that they marked a period of high level prevalence associated with an inadequate water closet service, brought to an end by the increasing enforcement of a provision obtained in 1890 compelling the introduction of water closets in reasonable numbers wherever possible.¹ We have seen, however, a corresponding fall in Scotland, associated, I think, with the development of County sanitation.

¹ See Glasgow Police (Amendment) Act, 1890, Sec. 30.

In any case the difference between the attack-rates at the beginning and end of the period are sufficiently striking. In 1891-95 this rate averaged 1,129 per million; in 1915-19, 144. In 1891, 60 per cent. of the cases were removed to hospital; in 1895, 75 per cent.; in 1915-19 it varied between 92 and 97 per cent.; in 1910 and 1915 all the known deaths from the disease occurred in hospital.

It is worthy of note, however, that despite the phenomenal decrease in prevalence the case-mortality has remained not only high, but is

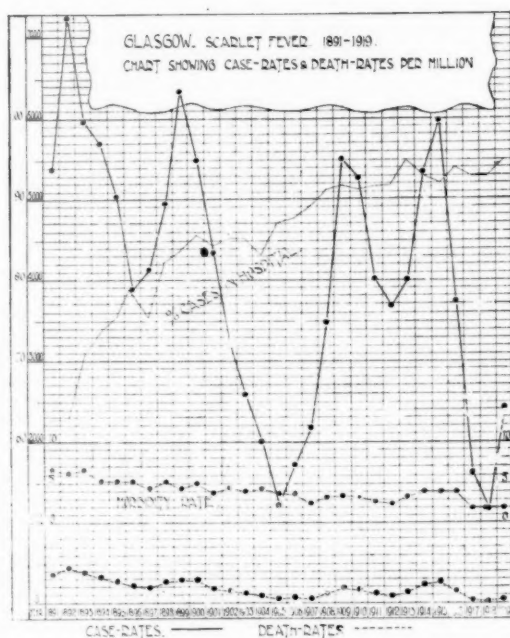


CHART 5.

Glasgow. Scarlet fever, 1891-1919.

fairly stable. In the earlier years it averaged 17, in the later 18 per cent. Prevalence and morbidity are completely unrelated. Despite the decreasing incidence there is no evidence that the virulence of individual attacks is becoming modified. Attack always seems to result from a mass-infection.

Scarlet Fever (Chart No. 5).—Here by way of contrast the case-mortality in hospital cases declined from 6 to 2 per cent., and in home

cases is correspondingly low. Removals to hospital rose from 63 to 95 per cent., but the attack-rate has markedly fluctuated with a tendency towards maxima at intervals of seven and ten years. The peaks of subsequent years are, however, lower than that of 1892. Compared with enteric fever the attack-rate is always on a high level. In 1892, when there was a well marked and extensive milk epidemic, the attack-rate exceeded 7,000 per million: in 1900 it exceeded 6,000; in 1909 it was 5,500, and in 1915 again 6,000. Two periods of well marked low prevalence occurred in 1905 (1,235) and 1918 (1,193), and there were secondary depressions in 1896 (3,874) and 1912 (3,687).

In recent years—since indeed the first marked depression in prevalence in 1905—there is some indication that case-mortality fluctuates with case-rate, but this is not so obvious before that period, and the general impression made by the chart is, I think, that the factors which determine infectivity do not necessarily also affect virulence. It may be that a higher standard of domestic cleanliness is removing the factors which led to mixed infections in the past, and that we are now dealing with a simple infection which has few septic tendencies. In this way "mildness" in type might be explained as well as the synchronism between attack and fatality-rates suggested by the chart of recent years. This line of argument has its limits. Variation in type, from malignancy to extreme mildness, has for long been recognized in the history of scarlet fever, but the malignant type of former years would appear more frequently to have prevailed through whole epidemic periods rather than to have been limited to the relatively small number of malignant cases which occur in present experience.

Diphtheria and Membranous Group (Chart No. 6).—In dealing with Scotland as a whole we saw that diphtheria, including membranous croup, differed in the character of its movement both from enteric and from scarlet fever. In the main it rose instead of falling like enteric, nor has it any of the short-time but wide fluctuations of scarlet fever. It is rather a movement of mass which takes about twelve years to complete. In Glasgow the isolation-rate rose from 16 per cent. in 1891 to 57 per cent. in 1901; 90 per cent. in 1911; and an average of 93 per cent. in the years 1915-19. On the other hand the fatality-rate fell from an average of 26 per cent. in the years 1891-95 to 16 per cent. ten years later, and an average of 11 per cent. in the last five years. But in contrast with this there has been a wave of prevalence affecting, as we have seen, town and country alike. It began in 1898-99, but the

increase was not rapid until after 1904. In 1910, when its maximum was reached, the attack-rate in Glasgow was 2,435 per million, compared with 592 in 1898. In this fourfold increase the practice of swabbing the throats of contacts must be remembered as likely to increase the number of those with passing symptoms who, but for the association and swabbing, would have escaped recognition as affected by the disease. But any tendency to attach too much importance to this element in the increase is corrected by the fact that the deaths per million of the population rose from an average of 134 in the years 1901-05 to 205 in 1906-10; was still 221 and 232 in 1911-12, and for

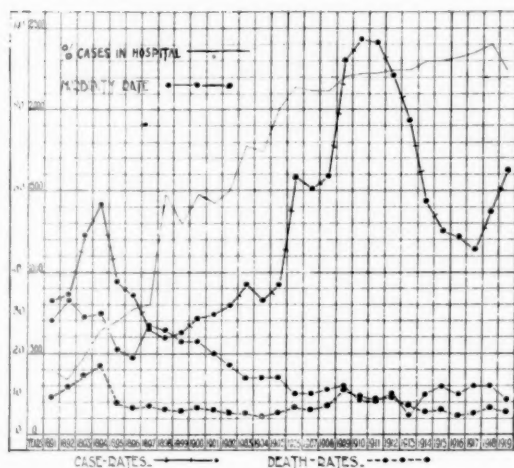


CHART 6.

Glasgow. Diphtheria and membranous croup, 1891-1919. Case-rates and death-rates per million.

1915-19 averaged only 145, although swabbing is not less practised than formerly.

The case-mortality of a disease for which there is a specific anti-toxin can scarcely be compared with others in which symptoms fall to be treated as they arise. We have seen that the fatality of enteric fever remains stable, and that in scarlet fever it is declining. In the 1901-05 period, which preceded the marked rise in diphtheria prevalence, the fatality-rate averaged 16 per cent.; when prevalence was rapidly increasing in 1906-10 it fell to 11 per cent. Had this coincided

with the introduction of antitoxin, improvement in the technique of its administration might have suggested an explanation, but under the circumstances it would rather seem that the organism of diphtheria had acquired a widely infecting power without also becoming at the same time more virulent.¹ During the period of decreasing prevalence which followed and was arrested in 1917, there is a suggestion, arising from the slightly greater case-mortality, that lessening infective power was accompanied by some increase in virulence.

ISOLATION, PREVALENCE, AND THE NATURAL HISTORY OF EPIDEMIC DISEASE.

Hitherto we have been considering fluctuation in prevalence in relation to a degree of isolation ultimately reached. Were this relationship a simple one a high percentage of isolation coinciding with a low prevalence of a given disease would suggest the approach of a period when its volume would become negligible. Also, on the contrary, a low degree of isolation, in so far as it left many centres of infection distributed throughout a community, would be a prelude to increase in prevalence. When notification revealed the rising incidence of enteric fever in the early years of notification, the isolation-rate was already over 60 per cent. of the known cases. In 1898 and 1901 when the maximum prevalence for the period was reached, 87 and 85 per cent. respectively, were isolated. In subsequent years the isolation-rate further increased, and the attack-rate rapidly fell to a low level.

In scarlet fever a rising rate of isolation was associated with a falling attack-rate during 1891-96; but with an increasing prevalence during 1897-99. For six years thereafter a continuous and marked fall in prevalence took place. An attack-rate of 4,728 per million in 1899 was replaced by one of 970 in 1905. Looking at the figures of this year and without any knowledge of its subsequent history, an observer might without question have regarded the one movement as the direct consequence of the other. A high isolation-rate coincided with a low prevalence-rate—*independent centres of infection in home cases were relatively fewer than ever.* Despite this the recurrences of 1909 and 1917 leapt the barriers of isolation and taught us that there were features in the natural history of scarlet fever which isolation did not cope with.

¹ The transference of age-incidence already referred to must be taken into account.

Diphtheria affords a more striking illustration even of the same law. In epidemic periods only does its volume rise above the lower levels of scarlet fever, and there is an interesting correspondence between the epidemic prevalence of both in the period 1904-17, which recalls the eighteenth century uncertainty as to the difference between these diseases. Its isolation-rate was approaching 60 per cent. when the increased prevalence began, and had reached 80 per cent. in 1905 when the epidemic entered upon its most active phase. Isolation was thus a well-established practice before the acute epidemic phase began, but again, as in scarlet fever, diphtheria unrolled another page of its history and then receded, leaving us to interpret the writing as best we may. Moreover the experience was not limited to particular communities but prevailed throughout Scotland as a whole.

We need not revert to the contrasted curves of isolation and attack-rate in enteric fever. The preventive value of isolation there is reinforced and made effective by other agencies which make for purity in food, in drink, in surroundings, in habits. What, then, is lacking in our knowledge of the directions in which these other agencies may be applied to the causes of scarlet fever and diphtheria, the absence of which enables them to evade our grasp and robs isolation of so much of its preventive value? The ambulant case of enteric fever was the carrier of infection before the term acquired its present significance.¹ But diphtheria unrolled itself with the possibilities of the carrier in full view, and not unfrequently recognized, quite as effectively as scarlet fever in which the cause, in a similar sense, is unrecognizable.

Suggestion sometimes comes from the by-ways of observation. For several years we have noted all cases of scarlet fever occurring in households subsequent to the removal of an earlier case to hospital.² In the last six years these have numbered 529, and represent almost 3 per cent. (2·8) of the removals, a rate fairly comparable with that of "return" cases. Of the total, 61 per cent. occurred during the first week, and may be put aside as probably resulting either from simultaneous infection with a longer incubation period than the earlier case, or as true secondary infections. The others were distributed over subsequent weeks with a predominance in the second. One of my colleagues (Dr. Macgregor) has recently noted the recurrence of typhus fever in a

¹ See inquiry by Dr. Picken regarding occurrence of missed cases explaining local groupings, *Public Health*, 1915, xxix, p. 2.

² See also "The Relation of Housing to Isolation of Scarlet Fever, and to Return Cases," by Dr. Miles B. Arnold, *Proc. Roy. Soc. Med.*, 1911-12, v (Sect. Epid.), pp. 150-170.

tenement in a poor locality from which typhus fever had been removed twelve months previously and with no suggestion of missed cases between.

These may be simple coincidences, but it is right to say that although we carry out domestic washing and cleansing after removal, on a scale more extensive, I think, than is usually practised elsewhere, the destruction of insect life not adherent to persons or clothing or bedding, has not hitherto been one of the deliberate purposes, in the diseases we are considering. Dr. Hamer's observations on the coincident rise of scarlet fever with increased evidence of flea infestation are familiar to you.

Insect transmission is an accepted tenet of modern epidemiology, but the history of cross-infection in hospital wards is sufficient to guard against its exclusive acceptance. These cross-infections arise for the most part, although not invariably, from ascertainable sources, but once introduced they not infrequently establish a chain of recurring cases which continue to appear for a time much longer than could reasonably be explained by direct contact with recognizable cases. Scarlet fever affords the most common illustration, and more especially scarlet fever in diphtheria wards. The following is the experience of one of our own hospitals as described by Dr. Elliott, the Superintendent of Ruchill:—

"With regard to cross-infection of wards with scarlet fever it may be stated generally that when the primary case is removed at the outset it is somewhat unusual for secondary cases to occur, and extremely rare for further crops to make their appearance.

"To this general statement, however, there is a very striking exception in the behaviour of scarlet fever when occurring in a diphtheria ward.

"When the primary case has either been incubating or suffering from the disease on admission the experience is much the same as in non-diphtheria wards, except that the secondary cases are much more numerous and the likelihood of further crops is much greater, but they occur within the ordinary incubation period, and may be explained by case-to-case infection. This phenomenon appears to indicate a high susceptibility on the part of diphtheria patients to the virus of scarlet fever as compared with patients suffering from other diseases.

"Often, however, a case of scarlet fever will arise in a diphtheria ward in a patient who has been in the ward for a space of time well over the incubation period, and where a most careful scrutiny of all the patients and staff of the ward fails to bring to light any one on whom the slightest suspicion can be cast.

"In these instances the behaviour of the infection shows a striking change

from that indicated above. As a rule there will be the usual secondary cases and other crops. Then the time comes when the full incubation period has elapsed, no further cases have arisen, and ordinarily it would be assumed that the infection had been eliminated. But other cases do occur often separated from the previous case by a space well over the incubation period.

"Thus it will be seen that the condition with regard to infection in the ward remains as at the beginning of the outbreak—namely, scarlet fever occurring without any discoverable source, for of course all bedding, toys, &c., used by any of the previous cases have been destroyed or thoroughly disinfected.

"A possible explanation of this is the presence of a scarlet fever 'carrier' in the ward who remains unrecognized, there being no means of bacteriological investigation available such as there is in the case of diphtheria or enteric carriers.

"The fact that this succession of cases of scarlet fever does not occur in, say, measles wards, might be used as an argument against the theory of scarlet fever carriers, but when the obvious greatly increased susceptibility of diphtheria patients to scarlet fever infection is taken into account this seeming discrepancy is largely neutralized.

"The contrary condition which arises when diphtheria cross-infects a scarlet ward does not present the same problem, as cultures enable all positive throats to be segregated, and as matter of fact we now swab the throats of all scarlet cases on admission as a precautionary measure."

Mass Movement of Infection.

To be universally applicable, a theory of propagation should apply to mass movement of infection as well as to particular illustrations which are necessarily drawn from relatively limited areas.

We are considering for the moment the incidence of these diseases in Scotland as a whole, separated for convenience into Counties and Burghs. We have seen that the curves of incidence present a general correspondence and it may be well to note what exceptions occurred.

Scarlet fever in the Burghs as a group, and in the Counties, rises and falls simultaneously. The Glasgow minimum of 1905 (Charts Nos. 2 and 5) is part of a low level incidence common to the whole country. The maximal periods which followed occurred in Glasgow in 1909, and again in 1915, while in the groups of Burghs and Counties it occurred in 1910 and 1914—a year out, either way.

But in diphtheria while there is a general correspondence as to years of increase, the maximum incidence in Glasgow (Chart No. 6) was reached in 1910, but three years later in the Burghs (Chart No. 3) and

four in the Counties, and the retardation in the movement in all likelihood has some bearing on the manner by which the disease spreads.

Moreover, there is a suggestive arrest in the upward movement in Glasgow during the years 1903-05, and again in 1906-08, which also occurs in the Burghs curve in 1905 and 1907-08, and in the Counties in 1905 and 1908.

Whether the simultaneous movement in scarlet fever illustrates one method of spread, as by mediate infection through insects, and the slower movement of diphtheria another, as by ordinary contact, is subject for discussion into which movement in insect life, as well as movement of population and changes in the organism itself—must enter.

To explain the mass-movement of scarlatinal infection over so wide an area and within so limited a period by reference to insect life alone suggests questions to entomology which that science at the moment cannot answer.

I once watched a movement of rats along the upper reaches of one of our best known Scottish rivers. They came from no one knew where, and located themselves for a year in an upland farm. It took quite a year for them to move to another about a mile farther down, but in twelve months more they had moved about eight miles. The movement was gradual, and food I have no doubt directed it.

In scarlet fever the movement is rapid and affects almost simultaneously areas widely apart. We may assume the recurrence of conditions favourable to the rapid multiplication of insect life, at intervals of years, but they would be of a different order from those which produce the usual seasonal variations. They would also require to coincide with variations in the infecting power of the disease organism itself.

But as a practical issue the added information which recent years have brought of the part played by insect carriers is sufficient warrant for disinfecting houses as well as disinfecting them. As in plague the verminous house may have a like epidemiological significance with the verminous person.

The Minor Infections and Some Others.

We may use the term "minor infections" for convenience, although it has ceased to have any substantial significance, and none at all if considered from the point of view of mortality.

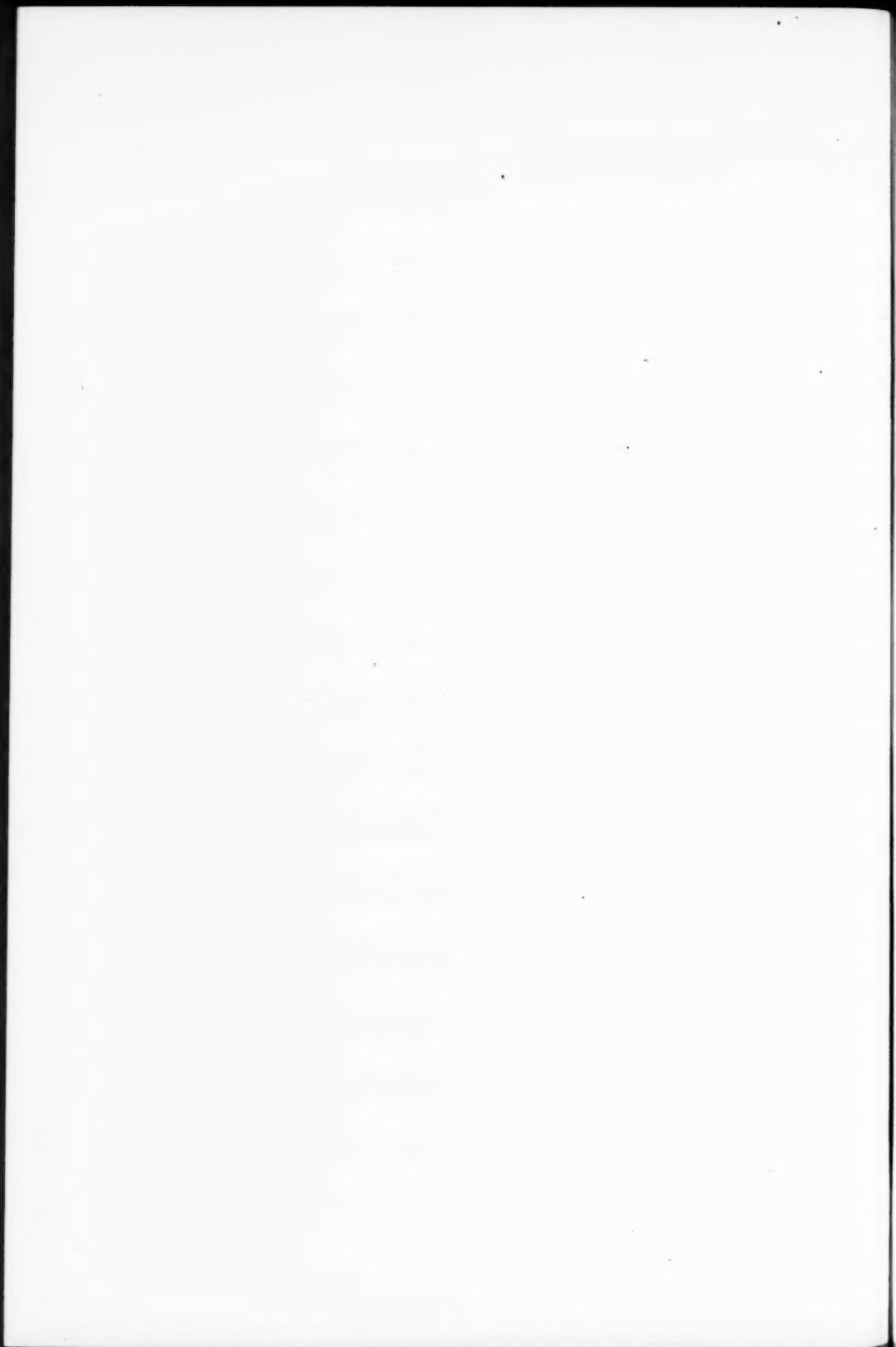
Here, local customs vary to such a degree that nothing approaching a general policy can be stated. Even in scarlet fever this variation occurs. One authority may remove to hospital less than half its scarlet fever. In some hospital towns, especially where a teaching centre is established, enteric fever is admitted to general hospitals—in other centres, hospitals adopt a practice of rigidly excluding everything in the nature of infectious disease. In others neither measles nor whooping-cough may be treated in hospital, and are only occasionally followed by home disinfection. Erysipelas, when dealt with, may be relegated to a Poor Law hospital; puerperal fever to a hospital for women; ophthalmia neonatorum and trachoma to an eye infirmary. These illustrations are not all drawn from Scotland.

An indication of these widely differing customs is afforded by a comparison of the annual cost of isolation hospitals in different places. Taking four large cities, the estimated annual outlay, for the present year, on isolation can be stated as 3s. 5d., 3s. 0d., 1s. 11d., and 1s. 3d. per head of population. Volume of disease will affect the comparison, but local custom is the more potent element. So far as local custom reflects local need for preventive isolation, the position may be clear, but what will be our answer to the suggestion that adequate facilities be provided for treatment when home facilities are inadequate? If a united front is to be presented to disease, all infections, and not some only, will require consideration, and growth in knowledge may well bring some of the parasitic skin infections within range of preventive action.

In the illustrations which I have cited of epidemic spread out-running isolation, it is not isolation that has failed, but that our limited knowledge of the causes of spread is as yet unable to supplement it by suitable action in other directions.

Circumstances have compelled the displacement of epidemic hospitals from proximity to the teaching schools, and tended to restrict their functions to isolation and treatment. The increasing variety of diseases already being treated in them makes the development of clinical research a necessary addition to these.

In the interest alike of the Community, the State, and the training of future Practitioners of Medicine, a time should come when the epidemic hospital will become an institute for research applied towards the elucidation of the problems with which infectious disease is surrounded.



Section of Epidemiology and State Medicine.

President—Dr. A. K. CHALMERS.

Certain Measures for Preserving the Health of Seamen on Board Ship.¹

By ARNOLD CHAPLIN, M.D.

ALTHOUGH we are foremost as a maritime country, and although our existence depends upon our ability to carry on trade by means of ships, scarcely any attempt has ever been made to study systematically the conditions of health among those sailors upon whom we rely largely for our efficiency as a trading nation, and for our influence as a factor in the progress of the world. Indeed, while all other branches of the subjects of hygiene and epidemiology continue to receive ample attention, for some unexplained reason the questions of health and incidence of disease on board ship are rarely considered.

The Ministry of Health will soon, I understand, be responsible for the health of those who follow their vocation on the sea as well as for those on the land, and while the Ministry is studying the conditions of the vast territory recently acquired, I would venture to direct attention to some of the problems likely to be encountered. To me, the subject of the health of seamen is of absorbing interest, for, during twenty years, a large part of my professional life has been occupied in dealing with this question, and for a long time I have felt that the subject required more consideration at the hands of those experts who make a study of hygiene and epidemiology.

To-night, I propose to deal with the subject under two divisions—viz., (1) the mortality and incidence of disease among seamen;

¹ At a meeting of the Section, held November 26, 1920.

(2) some measures necessary on board ship for preserving health. Before, however, a consideration of these matters is attempted, it will be necessary to state certain facts concerning ships, in order to clear away misconceptions that seem fated to arise in the minds of many who have approached the subject.

Now, when the question of hygiene on board ship is considered, the mind almost always turns to what has been done on land, and it is commonly supposed that, the principles being identical, the remedies must be the same. That road can only lead to disaster. A ship, as we understand it to-day, is the result of innumerable compromises, and this fact can hardly be insisted upon too strongly. The passenger would prefer the ship to be all luxury and comfort, the sailor easy to handle, and the owner economical to work. So also where health is concerned; the hygienic enthusiast would build his ship much as he would a sanatorium or a hospital, and he might regard the owner as unreasonable if he pointed out that his ship was designed, not to carry sick people, but passengers and cargo. In every department of a ship, whether it be the engine room, the crew quarters, the cargo space, the passenger quarters, or the medical arrangements, the final result has been obtained by means of compromise. This means that no department on board ship can approach the ideal without encroaching upon some other department. I would, therefore, beg of you to dismiss from your minds the idea that the principles of hygiene on board a ship can be satisfied in the same way as on shore, where space has few limitations. I would also ask you to remember that the main object of a ship is to carry on our commerce, and that nothing should be done to interfere with that object so long as the reasonable laws of health are obeyed.

Another misconception has arisen through a slavish adherence to the idea that life on board ship is attended with an unlimited supply of fresh air. Of course the ship itself is always in fresh air, but the greater part of its internal accommodation is liable to become vitiated with foul air, and the problem of efficient ventilation is one of the most important with which the naval architect has to deal. Added to this, the sailor has a positive horror of draughts, and he will always attempt to prevent the ingress of fresh air into his quarters. Indeed, when the naval architect has arranged for plentiful ventilation in the crew quarters, he should pay a surprise visit to those quarters when occupied by the crew. He would probably find every crevice through which fresh air might come securely stuffed up with anything handy.

A third and final misconception must be mentioned. It is often supposed that an unusual amount of sickness is met with on board ship, but this is by no means the case, as statistics will show. Sailors must of necessity be men of vigorous constitutions, and in most companies they have been subjected to a satisfactory medical examination before signing articles. With these points emphasized, an investigation may now be made of the mortality and incidence of disease on board ship.

For the purposes of the study of the incidence of disease in the Mercantile Marine the data are very scanty and imperfect. All that exists is the Annual Report of Mortality in the Mercantile Marine published by the Board of Trade. In that report all the deaths taking place amongst seamen are given, and the probable causes of death, but it is silent regarding epidemics, and sickness which, while not proving fatal, might, nevertheless, seriously compromise the working capacity of seamen. The causes of death must also be received with considerable reserve, for since less than 600 ships on the British Register out of some 10,000 are obliged to carry a surgeon, it is evident that all the causes of death except an insignificant minority, are the result of diagnoses made by the masters of ships, and can, therefore, have but little medical value. Of course, given the number of deaths, an educated guess may be made as to the approximate number suffering from the disease, but no real data exist for making such an estimate. It is difficult to see how the situation may be remedied in existing conditions, for surely the time will never arrive when every sea-going ship, however small the crew, will be obliged by law to carry a qualified surgeon. But a knowledge of the incidence of disease on board ship is so important that every effort should be made to create records that can be relied upon. To accomplish this end I should welcome a modification in the method of making the Annual Return of Mortality in the Mercantile Marine. I would like to see the Returns of Mortality, on all ships carrying a qualified medical man, placed in a category apart from the other Returns. I would also like to see regular returns of sickness occurring on board ships made compulsory, where qualified medical men are carried. At present little is known concerning the incidence of disease on board ship, but if these modifications were introduced (and no great difficulties would be encountered in their introduction) records would soon be built up from which most important deductions might be made. It is surely useless to attempt to repair the wall unless the situation of the weak points be known.

A rough, but fairly accurate, method of estimating the health of a ship's crew consists in finding the proportion of sick days to the total number of crew days run on a voyage. This method I have used for many years. Over a period of fifteen years I find that the proportion of sick days to the working days is as 1 is to 300. That proportion is taken to be the normal index of sickness, and if the index rises to an appreciable extent on any given ship it becomes a matter for investigation. But for the purpose of a more detailed study of the incidence of disease on board ship, I have, for the past eighteen years, compiled returns of the mortality and sickness occurring in the companies I have the honour to advise. I am not aware of any other tables dealing with the incidence of disease in the Mercantile Marine, and although they are far from perfect, they are introduced to your notice to-night as an example of the lines upon which an investigation of this subject might proceed under the guidance of experts.

In the first place we may inquire what the official figures published by the Board of Trade tell us concerning the rate of mortality in the British Mercantile Marine. Nearly a quarter of a million seamen were employed in the Mercantile Marine in the year 1912, of which number 45,000 were lascars. The rate of mortality on steamships from disease was 3.5 per thousand for European or white seamen, and 5.4 per thousand for lascars or natives. Further, the statistics for previous years show that the rate of mortality has slightly improved during the last twelve years. Speaking generally we may regard these rates of mortality as favourable, and they will be found to be better than the rate for those of the same ages employed in industrial work. They are not, however, as good as the rate obtaining in the Royal Navy in times of peace. So far the Annual Report of the Board of Trade will help us, but, for the reasons stated above, that report cannot be relied upon when we come to consider the causes of death and the incidence of disease. For this part of the subject, for want of better data, I am forced to deal with my own tables based upon the sickness and mortality occurring in the companies I advise during the last sixteen years. During that period the average annual rate of mortality for Europeans has been 2.6 per thousand, and for natives 4.2 per thousand. The lower rate of mortality here given, when compared with the Mercantile Marine, I attribute to the facts that conditions of life for the sailor are better in the large companies, and a far more rigid method of selection obtains in those companies than in many smaller and less important lines. I may here state that my own figures have reference to crews

and officers who have served the company for at least a year. No calculation has, therefore, to be made when dealing with annual averages, for those who were in the service of the company for a part of the year only.

When disease of any kind breaks out on board ship it is much more liable to spread, and is much more difficult to control than on land. And when the confined space on board ship is considered, it is obvious that the problem of control of disease is a matter of considerable trouble. For this reason we must expect on board ship a higher percentage of any given disease than we are accustomed to meet with on shore. As would be expected, those diseases which are communicated by means of the air passages and contact are responsible for the largest outbreaks. For instance, influenza, when it once seizes upon a ship, spreads at an alarming rate, and in a short time the ship is converted into a hospital. I have known common catarrhal conditions affecting the upper respiratory passages to run through a ship until as many as sixty per cent. of the ship's total complement have become affected. On the other hand, given a ship's company free from infective conditions, there are few places in the world where the health of a community is so good. Another factor which contributes to the spread of disease on board ship is the lowering of resistance caused by apprehension, and the knowledge that exposure to the disease must be endured until the vessel arrives in port.

In discussing the principal diseases responsible for the rates of mortality and sickness in the companies I advise it must be remembered that those companies are more prone to certain diseases common in the Eastern Tropics, since their trading routes are situated in that quarter of the globe. Judged by the experience of my own companies the diseases causing most trouble are as follows: Pneumonia, phthisis, heart disease, the effects of heat, beri-beri, enteric fever, malaria, plague, mumps, chicken-pox, measles, dysentery and influenza. Several of these complaints occur so frequently that they merit special reference.

Pneumonia is one of the most dangerous diseases met with on board ship, especially when it attacks natives. The rate of mortality is always high, amounting to 0.3 per thousand Europeans employed, and 0.8 per thousand in the case of natives; 12.8 per cent. of Europeans attacked die, and 35 per cent. of natives attacked succumb to the disease. In fact, amongst natives, pneumonia yields a higher percentage of deaths of those attacked than any other disease except plague. In the case of plague, 50 per cent. of natives attacked die, and 28 per

cent. of Europeans. As to the cause of this high mortality from pneumonia amongst natives it may be stated that the Lascar, however much warm clothing may be given him when in cold latitudes, will hardly ever consent to wear it, and as would be supposed, most of the cases of pneumonia occur when the ship is in European waters, and during the months of January, February, and March.

Pulmonary tuberculosis is another disease which causes a considerable amount of mortality, and I regret to have to admit that succeeding years show no diminution in its ravages. So far as Europeans are concerned the incidence of this complaint is not heavy, for the average annual number of cases is less than 2 per thousand employed, and the rate of mortality is 0.14 per thousand, while the percentage of deaths to cases occurring is 7. Natives are much more prone to the disease; 5 per thousand are attacked yielding a mortality rate of 0.47 per thousand, and the percentage of deaths to cases occurring is 10. The peculiar conditions existing on board ship have much to do with the spread of consumption, and although unceasing efforts are directed to the arrest of this complaint in the shapes of isolation and disinfection, so far I have not been able to record any sensible diminution in the incidence of the disease. However much fresh air is desirable, the inherent determination of the native to exclude it from the quarters occupied by him has so far been victorious. Nor must it be supposed that climate has much to do with the spread of phthisis on board ship. The tropics, the sub-tropics, and the temperate zones appear to favour the complaint in equal degrees.

Since the companies I advise trade in the tropical regions it is only to be expected that the effects of heat leave their mark upon the records of mortality and sickness, and Europeans are, of course, most prone to be affected. The rate of mortality amongst Europeans is 0.35 per thousand employed, and among natives 0.16; 8 per cent. of Europeans attacked succumb to heat apoplexy, and 22 per cent. of natives. In cases of heat apoplexy the rate of mortality depends in a remarkable degree upon the promptness and efficiency of the treatment given, and the experienced surgeon will probably save more lives than one who does not appreciate the fact that the essence of successful treatment is dispatch and thoroughness.

Dysentery causes but little trouble, for the number of cases is small, and the mortality insignificant. During the sixteen years under review 116 Europeans have been attacked, and 2 only have died, while the figures for natives are respectively 124 and 10.

From time to time small outbreaks of beri-beri have caused some trouble, but of late these outbreaks, which are confined to the natives, have ceased. This so-called "ship beri-beri" has almost always been brought about by using the polished variety of rice, and when the under-milled variety of rice has been substituted the attacks have subsided. During the war it became a difficult matter to obtain the "under-milled" variety with the result that beri-beri re-appeared.

Heart disease also contributes to the death-rate to the extent of 0.3 per thousand employed in the case of Europeans, and nearly 0.4 per thousand in the case of natives. Selection of a strict kind is the best safeguard against death and incapacity from this disease.

When infectious diseases such as enteric, small-pox, and plague break out their control is much more difficult on board ship than on shore. Plague is of course most fatal, especially among the natives, and the percentage of deaths to the cases is, in the case of Europeans 28, and in the case of natives 50.

Although my figures relate to ships trading to the Tropics, malaria is not a condition that causes a large amount of sickness or mortality. During sixteen years we have only had nine deaths amongst Europeans, and ten amongst natives, with an annual mortality-rate of 0.18 per thousand among Europeans employed, and 0.09 per thousand natives.

The influenza epidemics of 1918-19 hit the shipping community severely, and in the case of natives the mortality was somewhat high. The incapacity resulting from the scourge was considerable and on two occasions a ship was invaded by the disease to such an extent that not enough men escaped to permit of the vessel being navigated across the ocean.

Much has been said and written concerning the prevalence of venereal disease amongst seamen, but I am satisfied after keeping records for a number of years that it is not nearly so common as is supposed. In fact I do not believe that the sailor with all the temptations attendant upon his calling is much more liable to venereal disease than people on shore.

Before closing this part of the subject I must not omit to mention that three minor infectious diseases are specially prone to break out on board ship. They are mumps, chicken-pox, and measles. These diseases cause considerable trouble on board ship, and often strain the isolation accommodation to breaking point. Natives are specially prone to mumps and chicken-pox, while measles often attacks Europeans.

In the foregoing I have attempted to place before you some facts

concerning the mortality and incidence of disease on board ship. The figures can only be regarded as a step in the direction of acquiring information. With more perfect methods, and with a more general application of these principles, a knowledge of disease on board ship would soon be gained, and measures could be formulated to deal in an effectual manner with the subject. As the result of a first glance it may be submitted that the mortality-rate is by no means bad, although doubtless with increased knowledge it may become better. Nor is ill-health among seamen considerable, though here again improvement would result from a wider experience of the conditions.

Now, assuming that the foregoing account of mortality and incidence of disease is substantially correct, it becomes necessary to discuss the means to be adopted to improve the health of seamen. Such a topic will afford a stage on which all shipping interests can meet and agree, for it is equally important to all. In any discussion concerning the preservation of the health of seamen I would place first in the list of measures to be carried out, the importance of submitting every seaman to a thorough medical examination before he signs on to take the voyage. In all large companies this is done in a proper way, and the result is increased efficiency on the part of the crew. But in many cases the work is done in a perfunctory manner, or not at all, with the result that the health of a voyage is marred by diseases that are easily preventable. In fact I would welcome the institution of a special form of medical examination to which all those going to sea should be subjected.

Next to a medical examination of the crew previous to sailing, comes the sanitary efficiency of the ship, a vast subject which embraces questions of space, light, air, food, and water. Time, however, will not permit of these important subjects being discussed, and they really belong to the province of the health authorities; I intend, therefore, after touching lightly upon the vexed questions of air, space and ventilation to pass to the important subjects of disinfection and the medical accommodation necessary on board ship to cope with disease.

First as to space and air. As you are no doubt aware the space allotted to the crew under the provisions of the Merchant Shipping Act amounts to 120 cubic ft. per person, and this space must include 15 superficial ft. Deductions may, however, be made from this cubic content for furniture and bunks, so long as 72 cubic ft. are left for each individual. Now this space when compared with that usually allotted to the individual on shore does not appear any too liberal, but several

factors must be taken into account when passing judgment upon this subject. All people on board the most capacious liners are subjected to crowding unheard of on shore. The limitations of space on board ship totally forbid anything approximating the usual space common to life on the land. Then again, it must be remembered that the crew quarters are never occupied at the same time by the whole of the crew, for a certain proportion is always on duty. But the economical working of a ship must always be estimated in adjusting this question. Let us suppose for the sake of argument that it is decided to increase the cubic space for each member of the crew to 240 cubic ft. on a large passenger liner with a crew of 300 or 400. The crew cannot be reduced, the engine space must remain the same, and no reduction can be effected in the bunker capacity of the ship. Some department must, therefore, be curtailed, and the only department left is the passenger department. To give 400 men an additional 120 cubic ft. of space means that 48,000 cubic ft. must be taken from the passenger accommodation. Assuming that each passenger is allotted 300 cubic ft. of space, accommodation for from 160 to 200 passengers would be sacrificed, with the almost inevitable result that the ship would become an unpayable proposition. In a cargo ship the only space on which to encroach would be the holds, and here again the money earning capacity of the ship would be seriously compromised. But no judgment is passed and enough has been said to show that the problem of increasing the cubic space per person on board ship is not nearly so simple as on land, and factors have to be taken into account which render the subject one of considerable difficulty.

The question of a safe and efficient water supply on board ship will also engage the attention of hygienists. Nowadays great care is taken to keep the tanks in which the water is stored in a clean and wholesome condition, and it is becoming rare to be able to trace an epidemic on board ship to water contamination. Of more importance is the question of the source of the water supply, and the condition of the filters on board ship. It is to be hoped that more attention will in future be bestowed upon the filters, not so much with reference to the kind of filters used, but rather to their efficient and periodic cleaning. Since water for ships is frequently supplied from water barges, it is of the utmost importance that these barges should be under the supervision of the Port Sanitary Authority, who should insist on regular cleaning, for the condition of these receptacles is by no means above suspicion in every port.

Food and water on board ship are not now fruitful sources of

epidemics, and when enteric invades a ship its origin can more often be traced to articles taken in at foreign ports. Fruit when brought to the ship's side by small traders, and salads, are always suspect, and the experienced hardly ever partake of such articles.

Disinfection and fumigation of a ship may be considered from two points of view, viz., that form of disinfection carried out by the Sanitary Authorities when the vessel arrives in port, and the disinfection carried out by the ship's surgeon or other officer while the ship is at sea. The former can only be done efficiently by means of special apparatus, and forms no part of the ship-owner's responsibility. Lately a regulation has come into force by which all ships must be fumigated at regular intervals, and in principle the regulation is most wise. Sulphur dioxide gas is generally used, but it has its disadvantages, the chief one being the injury it does to cargo and various other articles with which it comes into contact. Nor is it by any means certain in its effects, for I have known a ship to be thoroughly fumigated from end to end, resulting in the destruction of about two dozen rats, while during the succeeding voyage to China, the boatswain's cats destroyed over 800 rats on the same ship. In order to rid a ship of rats and other pests a gas is needed which, while absolutely fatal to vermin of all kinds, will do no damage to any article or any individual with which it comes in contact. Experiments are now being carried on with hydrocyanic gas, and if it can be safely used, it will answer the requirements. When that, or any other method, is perfected it will be possible to disinfect a ship with all its cargo and furniture *in situ*, but until that can be done fumigation of a ship must be considered as unsatisfactory.

When disinfection has to be carried out on board ship during the voyage I prefer it to be done with formaldehyde solution as a liquid disinfectant, and by means of formaldehyde gas and potassium permanganate as a gaseous agent. All parts of the ship should be disinfected at regular intervals, after any outbreak, and I make it a rule that quarters occupied by tuberculous people must be treated in the same way as during the outbreak of any other definite infectious complaint.

I now propose to direct your attention to the question of medical accommodation on board ship, and since I hold this subject to be of the utmost importance I shall attempt to give it ample consideration. However desirable it may be to have a ship hygienically sound, it is doubly important to have at command arrangements complete in every detail to cope with illness when it occurs. During the last twenty years truly great advances have been made and the comparison of what was

considered sufficient in days gone by, with what is usual now, affords profound and gratifying reflection. The old idea concerning the surgeon and his accommodation was crude in the extreme. He was regarded almost with suspicion, as a necessary evil forced by law on an unwilling company. His pay was low, and it was only too evident that the men who could be attracted by such meagre remuneration were, to say the least, not the leaders of their profession. He had, it is true, a cabin, and sometimes a dispensary, but more often he had to be content with a medicine chest not unlike that described by Woodall in his "Surgion's Mate" published in the year 1639, and in some corner of an alley-way he performed his duty as a compounder of drugs. Now, however, all that is changed. The medical men who follow their profession on board ship form a fine and able class of men, and the accommodation afforded them is, as a rule, all that can be desired.

The surgeon requires for the proper performance of his duties on board ship a cabin for himself, a surgery, hospital cabins and isolation cabins. With any of these lacking he cannot be expected to do his duty satisfactorily, as a medical man on board ship. The Merchant Shipping Act states that every ship carrying 100 persons or more must carry a surgeon, and about 600 ships on the British Register out of a total of about 10,000 fall under this definition. As the law stands, therefore, the medical service at sea is limited, and does not require much more than an annual supply of a thousand qualified men.

With regard to hospital accommodation, the Merchant Shipping Act takes cognizance only of ships carrying third class, or steerage passengers, and states that on these ships hospital accommodation shall be provided on the upper passenger deck having 18 superficial ft. for every fifty passengers carried. Nothing is said in the Act concerning other passenger ships, but in practice, of course, hospital accommodation is always provided.

In considering the question of isolation and hospital accommodation, their position, number and size, again the all pervading influence of limitation of space must largely govern any counsel of perfection in this respect. In building medical accommodation for the surgeon it must be remembered that the class of ship must determine, to a considerable extent the kind of medical accommodation required. Hitherto, no definite plan or plans have ever been laid down by those who administer the Merchant Shipping Act, and the naval architect has been left to his own devices in planning hospital and isolation cabins.

The result has been that few ships resemble each other in this respect although they have been built for the same kind of trade. Until comparatively recent times it was not considered necessary to consult medical opinion as to the best way of building hospital cabins, and the Mercantile Marine contained many ships with hospitals built and placed in such a manner that most of the laws of hygiene were violated. Owing, however, to the broad-minded spirit of shipowners a salutary change has taken place, and great advances have been made.

No emphasis is required in stating that all classes of ships do not need the same kind of hospital accommodation, and a great difficulty would be overcome if a definite plan for hospitals were laid down for each class of ship. I would urge, therefore, that a type of hospital cabin be considered and adopted for the passenger mail boat, the intermediate passenger boat, and the cargo boat. Armed with these stereotyped plans the naval architect would know what was required, and the necessity would never arise of reconstructing and altering after the ship has been built, with the attendant excessive cost of such a proceeding. This question I would impress upon the authorities, for it is not uncommon to see hospital accommodation inadequate in one ship and superabundant in another.

In order to elaborate this subject further, I will describe at some length the main provisions necessary to be observed in the construction of hospital accommodation, and will begin with isolation cabins. These main points embrace the questions of position, air, light and space. In determining the position of the isolation cabins a choice has to be made between the comfort of the patient and the safety from infection of the rest of the ship's community. In any case the isolation cabin must be placed on the uppermost deck, for the laws of hygiene would be violated if any other place were chosen.

If the comfort of the patient be first considered, the best place for the isolation cabins is on the uppermost deck as near amidships as is possible, but if the safety from infection of the rest of the ship's company be the main consideration, then the only place for the isolation cabin is on the uppermost deck as far aft as possible, with all the attendant discomforts produced by the motion of the ship and the vibration of the screw. I have had experience of both plans, but after reflection I have abandoned the considerations of the comfort of the patient, and have thought only of the safety of the ship's community.

In the case of the large passenger liner where there is ample space, the isolation cabins can be built in the stern on a small raised deck

with access by means of a short staircase. The cabins are thus completely shut off from the rest of the ship. The isolation cabins and the rest of the accommodation are divided longitudinally by a bulk-head passing down the centre, and each side of the bulk-head is portioned off into one or more isolation cabins placed forward. The door of the isolation cabin opens on to an alley-way, and on the other side of the alley-way are doors opening into the attendant's cabin, the bath-room and the lavatory. On the other side of the bulk-head similar arrangements are found, the intention being to have one side reserved for females and the other for males. The door giving entrance to the alley-way has a ventilator above it, and so also have the doors of the bath-room and the lavatory. By this method a free current of air is secured in the alley-way. The isolation cabins themselves have ample means of ventilation through wide scuttles and, if necessary, ventilators in the roof.

The size of the cabins should be 12 ft. by 12 ft. and 8 ft. high, and four people could be accommodated. This gives 240 cubic ft. per person, a cubic content I regard as sufficient when it is remembered that the ventilation is rapid, the cabins rarely full, and the situation open. It is true that 2,000 cubic ft. per bed is the allowance for an infectious case on land, but it will be remembered that we are dealing with limited space on board ship.

The material of which the cabins should be constructed is also important. In order to make a strong job, iron has often been used, but the result has not been a success, for iron, on account of its property of conducting heat and cold, renders it unsuitable as material for hospital construction. If it must be used, the inside must be lined with some non-conducting material. On the whole wood appears to be the most suitable material for this purpose, and it is well to have a double roof, or an awning. Radiators are of course necessary, and scuttles of ample size.

In a medium-sized mail steamer, where space is more limited, a slightly different plan may be adopted, and a saving of space may be effected by having only one attendant's cabin, and by placing the lavatory in the bath-room. As in the previous plan, the isolation cabin is separated from the attendant's cabin and the bath-room by a cross alley-way, which is ventilated at each end.

Where it is impossible, on account of limited space, to place isolation cabins on a deck apart from the rest of the ship, a barrier should be placed across the deck so as to prevent access to that part of the deck.

There is yet a third class of steamer requiring different treatment, so far as isolation accommodation is concerned, on account of the very limited deck space: I refer to the small intermediate passenger steamer. In these steamers it will generally be found that the space is strictly limited, and since the crew and passengers will not amount to more than 350, there is no necessity to provide large isolation accommodation. The best, indeed the only, situation for the isolation cabins on this class of ship is on the roof of the house occupied by the steam steering gear. In building these cabins sacrifices have to be made by leaving out of the plan an attendant's cabin. Here the hospital is entered through a vestibule which is ventilated, and the isolation cabin, the bath-room, and the lavatory open out of this vestibule. The plan has some imperfections, but in view of the limited space it is the best we have been able to devise.

On the cargo ships space is generally available for hospitals, and a much more simple arrangement can be adopted.

Possibly these plans are open to criticism, but at any rate they are superior to the method in vogue not so many years ago, when it was usual to place the infectious passenger in one of the ship's boats. It will always be difficult, and sometimes impossible, to place new structures never contemplated when the ship was built. For this reason I would urge strongly the importance of elaborating some plan in hospital construction for each particular class of ship; a plan which does not encroach upon the money-earning capacity of the ship, but which satisfies the legitimate requirements of sound hygiene.

We now pass to the consideration of the surgeon's cabin, the dispensary, and the hospital cabins. If isolation cabins must be placed on the uppermost deck, it is clearly undesirable, and often impossible, to build the ordinary hospital cabins contiguous to those structures. A compromise may be effected by placing the hospital cabin on the spar deck aft, a good situation being the after end of the starboard alleyway, looking out on to what was once the well deck. It is advantageous to have the surgery and hospital cabins in close proximity to the surgeon's cabin, and I show on the screen a diagrammatic representation of the arrangement. Hospital cabins should always be outside cabins, and the plan approximates to those given when speaking of isolation cabins.

Here, I regret that the subject must be left. I have attempted to approach the subject of hospital accommodation from the standpoint of practicability, from the point of view of the shipowner and the

sanitarian. To attain success they both must be prepared for compromise. The ideals of hygiene, as laid down on shore, can with difficulty be attained on board ship. If you decide that what is accomplished on board ship is inadequate, you must remember that the mortality and incidence of disease on board ship compares favourably with the incidence of disease and mortality among the same ages and classes on shore. May I urge again that the capability of a ship as a means of carrying on the trade of this country is paramount, and that all questions of ship's hygiene must be considered and settled with this fact present in the mind.

DISCUSSION.

Surgeon Rear-Admiral P. W. BASSETT-SMITH, R.N., said that from a naval point of view "compromise" was even more important than in the Mercantile Marine, yet great advances had been made in the hygienic conditions in their ships. It was quite true that when the air supply came down as a cold blast on the head or feet of a man he would try to prevent this by closing up the discharging orifice, but now better methods of distribution were installed eliminating draughts, and means were provided for warming the air if necessary. With regard to disease: *pneumonia*, which had such a high mortality among natives, was less common in Europeans, as their clothing was more protective. *Heat stroke* was more common amongst European stokers; although in the table shown the native incidence was double that of the European. *Beri-beri*: in the Navy on certain stations, they had employed Seedy boys, Chinese, Lascars, &c., and they were all susceptible. In the Indian Marine, to which he had been attached for two years, it was often prevalent but he disagreed with the author in considering that true beri-beri and ship beri-beri were identical. *Ship beri-beri* had often features of scurvy and was an intermediate condition between scurvy and beri-beri. Vigorous efforts had been made to evolve efficient anti-scorbutics. Holst and Frölich had prepared rapidly dried cabbage with retention of vitamins. At Bombay sun-dried vegetables had been experimented with and at Greenwich they had made cold dried lemon tablets. *Scabies* as a disease had not been mentioned; surely it was of considerable importance. *Typhoid* in ships was generally due to "carriers," not to the water on board. The provision of isolation wards was of very great importance and the plans showed excellent arrangements for large ships. There was no doubt that when it came to a question of the interests of the patient and the welfare of the ship's company, the former must suffer.

Dr. WILLOUGHBY urged the importance of hospital and isolation accommodation not only for large ships but especially for the many kinds of cargo vessels. As an illustration he mentioned a steamer boarded for the purpose of

examination of a case of enteritis. The crew was at dinner, and the case was found in a lower bunk against which members of the crew sat. Similarly during the influenza epidemic the want of isolation quarters for the first case or cases meant inevitable spread. The general hygiene of a ship was relegated to schedules in Merchant Shipping Acts except as to air and floor space. A Bill at present drafted intended that the cubic space per head should be raised from 120 to 140 ft. and the deck space to 18 from the 15 square ft. provided in 1906. The mere increase of space was not, however, of such importance as separate washing, sleeping and messing accommodation. The unhygienic state of a ship often began with the laying of its keel. If the accommodation were so separate a matter as to be dealt with by schedule and instructions to surveyors he thought the arrangement for the sanitary state of a ship both before and after launching might well be handed over to the Ministry of Health which, doubtless in the spirit of compromise necessary to the several interests which clashed in ship construction, could insure that the space available for crew accommodation be used to the best advantage.

Dr. REECE said that the Ministry of Health was, at the present time, only indirectly responsible through the local Port Sanitary Authorities for conditions on board ship affecting the health of seamen. The duty of the Port Medical Officer of Health in regard to ships was mainly concerned in securing abatement of nuisances, and whenever he considered that structural alterations on board were necessary, he was at once brought into relation with the local Superintendent of the Board of Trade, and it was by no means easy to define where the duties of these two officials began or ended. The Board of Trade was responsible for seeing that the amount of cubic space laid down in the Merchant Shipping Acts was allotted to the crew, and that the ventilation of the vessel conformed to a standard. The Board of Trade requirement in this matter related to natural ventilation; there was no prescribed standard for mechanical ventilation. Shipowners kept the plans of their ships as secret as possible, with the result that in practice the Board of Trade did not always see the plans of new vessels before they were built, and might never see them at all. When the crew were berthed forward there was a greater tendency, and at times a necessity, in rough weather to keep port-holes shut than was the case when they were berthed aft. Efficient ventilation of ships, always a difficult problem when reliance was placed solely on natural ventilation, became impossible in rough weather, when port-holes were closed and hatches battened down, &c. He (Dr. Reece) recalled Dr. de Chaumont's experiments in regard to ventilation conducted many years ago, which showed that natural ventilation by means of doors, windows, &c., caused draughts when the air of a room was changed more than three times an hour. The freshness of the air was estimated by the amount of carbon dioxide present: it was not suggested that the carbon dioxide in the room was dangerous to health, but it served as a reliable index of pollution of the atmosphere. In order to keep the air of a room fresh, it was necessary to supply 3,000 cubic ft. of air per head, and to

obtain these ideal conditions the minimum cubic space per head should be 1,000 cubic ft. Inasmuch as it was not possible by natural ventilation to renew the air of a room more often than three times in an hour without causing draughts, any attempt to do so resulted in the occupants closing or blocking the means of ventilation. When the amount of cubic space, 120 cubic ft., allowed to a seaman was considered, it would be realized that to secure the renewal of the air and to supply him with 3,000 cubic ft. of fresh air per hour, according to de Chaumont's standard, the rate at which the fresh air would have to be supplied would necessitate a velocity in the current amounting almost to a gale! No person could be expected to tolerate this. It was clearly desirable to attain as closely as possible to the 3,000 cubic ft. of fresh air per man per hour, and this could only be done on board ship by a system of mechanical ventilation carefully thought out. Certain main principles should be borne in mind. The air to be supplied should be fresh air taken in from outside the ship, and it should be introduced into the ship on the propulsion system. In winter and in cold weather it was essential that the fresh air should be warmed as it was introduced. In hot weather, such as was experienced in the Tropics, the fresh air on entrance should be cooled. The warming of fresh air could be done in several ways. The fresh air could be passed over steam coils delivered near but not at the floor or deck of the chamber or cabin to be warmed. The hot air would rise in the chamber, and the sailor would not be so likely to block up the ventilating shafts as undoubtedly he would do should the fresh air be cold. Another way of introducing fresh air would be on the principle by which air was supplied to certain ships employed in the fruit trade. The fresh air was carried down the sides of the ship, passed along the bottom over hot-water pipes, entered the interior by means of long channels, and being diffused throughout the whole compartment, draughts were avoided. Every compartment occupied by seamen should have an upcast shaft fitted with a cowl, to act as an exhaust pipe when the ship was in motion. A fan should be fitted inside this cowl which could be put into operation when the ship was in harbour, so that the movements of the air could be kept under control. A system of ventilation on board ships that depended entirely on an exhaust system should be avoided, as it might draw impure and vitiated air from heads, kitchens, engine rooms, &c., into the seamen's quarters. Experience had shown that the larger and many of the smaller shipping firms were prepared to entertain ideas for improving the sanitation of their ships, and if once it was realized that trade success depended in part on securing healthy conditions for the crew, the necessary steps to secure this would be taken. It was necessary also to instruct the sailors, who did not always appreciate, and did not take advantage of, the means available to secure, even rudimentary health conditions in their quarters.

Dr. MAJOR GREENWOOD said that although Dr. Chaplin's paper was the first upon this subject which had been submitted to the Section of Epidemiology and State Medicine, it was not the first to be printed in the *Transactions* of the

Society. That honour belonged to Sir Gilbert Blane's essay on the "Comparative Health of the British Navy," which appeared in the sixth volume of the *Transactions* of the Medico-Chirurgical Society (it was republished in Sir Gilbert's "Select Dissertations," issued in 1822). In view of the revolutions in naval architecture which had occurred since the time of Blane, it was interesting to remark that pulmonary diseases, pneumonia and phthisis, held the leading place in the statistical returns he provided,¹ and that Blane emphasized the importance of ventilation in ships. In Blane's time the mortality-rate of seamen was higher than that estimated to prevail amongst males within the same age limits on shore; Dr. Chaplin had pointed out that the relative position of sailors had in this matter improved. But they must remember that the physical selection of entrants to the service of the great shipping companies was far more stringent than that practised by the old naval press gangs, so that it did not follow that the improvement in hygienic conditions at sea had been relatively greater than on land. With respect to the fatality-rates in Dr. Chaplin's series, while some of the instances depended upon too small absolute numbers to yield reliable averages, it was interesting to note that the fatality of pneumonia was similar to that of normal male populations, and, of course, much below that of general hospital cases. For males in the experience of the Leipzig Insurance (State) Department, published in 1910, the fatality at ages from 20 to 40 increased with age from 7 to 17 per cent. In male patients admitted to the London Hospital (1854-1903) the fatality rose from 12 to 35 per cent. with the same age grouping. The only data not subject to selection for admission to hospital that he (Dr. Greenwood) had analysed were those published by Huss many years ago and related to the Stockholm Military Hospital. They showed a fatality of 7.3 per cent. The fatality of lobar pneumonia in hospitals had changed little in fifty years,² and seemed to depend mainly upon the physical and economic class of those exposed to risk.

Major-General Sir WILLIAM MACPHERSON said that he had had much to do with the health of troops on board ship during many years, and more than twenty years ago he had brought to the notice of the War Office and Admiralty the high incidence of pneumonia and deaths from pneumonia on board transports. The pneumonia mortality was estimated at that time at about three times greater than the pneumonia mortality amongst troops on land. He had specially emphasized the necessity of a better means of ventilating the troop decks, which, as Dr. Chaplin probably knew, were often on the lower and cargo decks of ships, and therefore below water level. He had had an opportunity in 1908 of making a voyage on one of the transports of the United States Army with the special object of studying the method adopted by the United States Army of ventilating troop decks. There was

¹ See p. 24 of the reprint in "Select Dissertations."

² See Greenwood and Candy, *Journ. Roy. Stat. Soc.*, lxxiv, p. 365.

a small deck house with a propulsion engine for the purpose of propelling fresh sea air through tubes into every part of the lower decks, and the air in these decks was as fresh as on the open decks above. There was an arrangement by which the air propelled into these decks was warmed over radiators when the transport was in a cold climate and cooled over ice when in a hot climate. He was sure that these conditions would satisfy entirely Dr. Reece's requirements with regard to ventilation, because the current of incoming air was continuous and gentle in the decks below. In his (Sir William Macpherson's) opinion the prevention of respiratory disease on board ship depended entirely upon the question of ventilation. With regard to statistics of the health of a ship's population, complete statistics of the diseases which occurred amongst troops on board ship had been recorded in the Army Medical Department Reports from the year 1862 onwards.

Dr. W. P. YETTS said there were ways by which systems of ship ventilation, however well devised, were sometimes rendered useless other than by the action of persons trying to evade draughts. For instance, a certain hospital ship, in which he was called upon to investigate defective ventilation, was fitted with a cowl and shaft system. He found that all her cowls were painted up so that none could be trimmed according to the wind. Several of the cowl-shafts, too, were found to be full of disused towels and all kinds of odds and ends. Such conditions arose through general lack of appreciation that the ventilation system was essential to the well-being of all on board and must be kept in working order as much as other parts of the ship's mechanism. The moral was not only that cowls and other air channels should be guarded with netting, &c., against being used as handy receptacles for rubbish, but that those in control of the ship, as well as the crew and passengers, should be taught the importance and meaning of ventilation. On the medical officer must mainly fall this duty of educating, and his also was the responsibility (in co-operation with the executive) that things were kept up to the mark. With regard to the increased attention now being paid to the water supply of ships, Dr. Yetts pointed out the existence of danger through accident, especially at Eastern ports. On one occasion, the ship in which he was serving was taking in water from a boat, and he was horrified to see one of the natives in charge of the boat in the act of defæcating into the tank from which the water was being pumped into the ship. The Admiralty had recently instituted the valuable safeguard of chlorinating all water taken into men-of-war from the shore. It was doubtful whether that would be generally adopted in the merchant marine, but it should be one of the duties of the medical officer always to watch over, in person, the taking in of water.

Dr. P. G. STOCK asked if Dr. Chaplin would answer two questions: first, what position on a vessel did Dr. Chaplin personally recommend for the accommodation of the crew? Dr. Chaplin had referred to the two schools, but in view of his wide experience his own view as to the best position would be most helpful. Secondly, could Dr. Chaplin give the meeting any inform-

ation as to what the practice was amongst shipping companies when the plans for a new vessel were being prepared; did they consult their own medical experts on the general arrangement and particularly the accommodation for the crew and other matters having a medical aspect, or were these questions left entirely to the architects?

Dr. O'DONOVAN said that the medical inspection of workers previous to employment needed careful weighing of the pros and cons; of this he had had great experience in the Ministry of Munitions during the War. By medical exclusion one could get together a collection of fit and stalwart men, but these would not be a collection of immune men, men free from the accidents of industry and of epidemics and intercurrent ill-health. Moreover, these men offering themselves as fit for work must, if excluded in one place, find employment elsewhere or become a public charge. The position as an absolute arbiter of employment, if widespread, would not tend to the popularity of their profession; he himself had seen three strikes originated by the tactless use of such a power in medical hands. In industries with a special health hazard a medical examination on entry might be justified, but its general adoption might well prove a dangerous policy.

Dr. CHAPLIN (in reply): With regard to the best position in which to place the quarters for the crew, he favoured the forward position for European crews and the after position for natives. So far as he was aware, it was now the practice to take medical opinion in the construction of the medical accommodation on board ship.

Section of Epidemiology and State Medicine.

President—Dr. A. K. CHALMERS.

Some Features of the Small-pox Outbreak in Glasgow, 1920.¹

By A. S. M. MACGREGOR, O.B.E., M.D., D.P.H.

(Public Health Department, Glasgow).

THE outbreak in Glasgow which began in the spring of 1920 is the first considerable invasion of this country by small-pox since the epidemic which prevailed between 1900 and 1905. Indeed, during the intervening years, the whole country has been singularly free from small-pox, in spite of repeated introduction of actual cases at the various seaports. In Scotland between 1905 and 1919 there have been thirty-eight deaths in all, only one of which occurred in Glasgow. The behaviour of small-pox in Scotland and Glasgow during the nineties and subsequently is shown in the following table, which gives the small-pox cases and deaths from year to year, since 1893.²

TABLE I.

Year	SCOTLAND (including Glasgow)		GLASGOW		Year	SCOTLAND (including Glasgow)		GLASGOW	
	Cases	Deaths	Cases	Deaths		Cases	Deaths	Cases	Deaths
1893	746	68	386	26	1906	23	1	3	—
1894	1,010	129	42	5	1907	8	1	1	—
1895	428	47	214	23	1908	82	6	2	—
1896	19	2	1	—	1909	6	—	—	—
1897	86	10	50	6	1910	11	—	1	—
1898	28	2	1	—	1911	29	5	2	—
1899	22	1	1	1	1912	57	17	—	—
1900	518	53	401	42	1913	1	—	—	—
1901	1,990	278	1,383	200	1914	6	1	—	—
1902	915	80	458	43	1915	14	2	—	—
1903	550	41	290	26	1916	2	1	—	—
1904	2,257	185	878	67	1917	—	—	—	—
1905	128	4	4	1	1918	11	—	2	—

This table shows that Glasgow in common with Scotland generally has had little small-pox since the epidemic period 1900-04.

In no previous period since 1871-74 has the continued absence of small-pox been so notable. Coincident with this diminished prevalence of the disease, a considerable decline in the practice in infant vaccination has taken place, sufficiently pronounced to modify the character of the population exposed to risk. A further modification has been introduced by the presence in the population of the large group of revaccinated ex-service men. Some interest, therefore, attaches to a descriptive account of the first considerable reappearance of small-pox, especially in view of some recent speculations as to its future in this country. It is proposed to give a brief outline of the behaviour of this outbreak in Glasgow, to discuss points of

¹ At a meeting of the Section, held January 28, 1921.

² Bruce Low, "Incidence of Small-pox throughout the World in Recent Years," 1918.

similarity or otherwise between it and previous invasions, and to deal with some aspects of its administration.

In order to allow time for the preparation of the data cases occurring after the end of November are not included in the tables. The Chart on page 45 shows the numbers sickening daily throughout the period from February onwards. The dates of sickening of the fatal cases are shown, and also the daily admissions to hospitals.

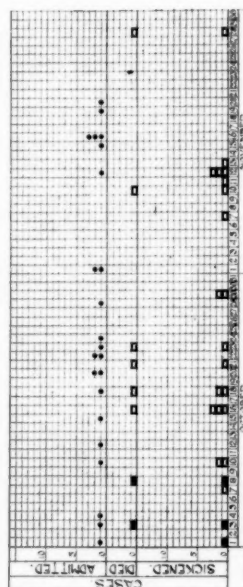
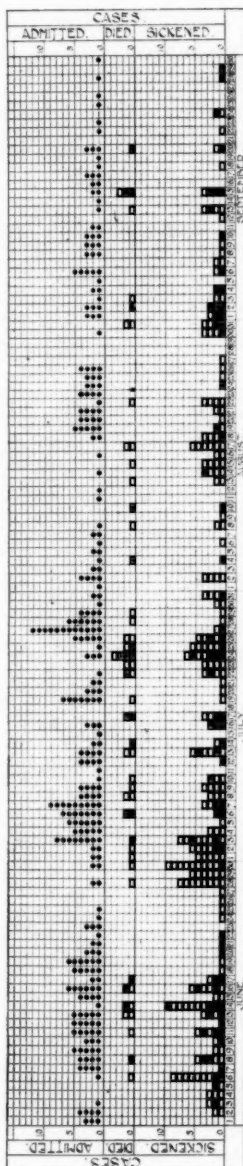
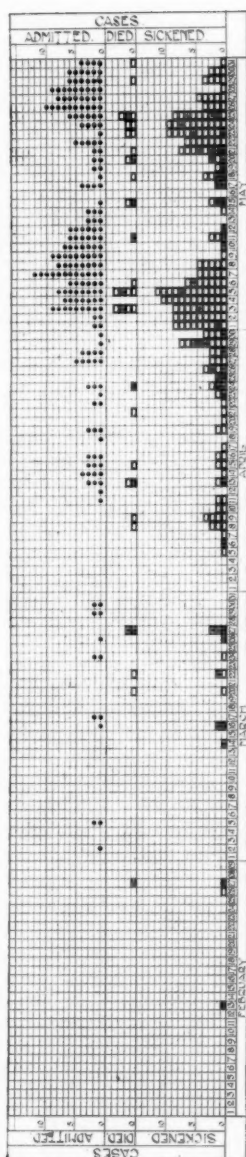
The outbreak was at its height during May, June and July, and gradually tailed off during the later months of the year. Its course presented certain unusual features. It never reached epidemic proportions, nor did it show any consistent rise and fall. It progressed rather by a succession of waves with a quite definite suggestion of periodicity (as if always endeavouring to establish itself in epidemic proportions and never quite succeeding), the first two or three of much the same amplitude, and the later ones gradually decreasing in volume. This undulatory progress is well shown in the chart. A feature of the outbreak was the continued occurrence of ambulant "missed" infections, as described later, and it was no doubt the presence of these and others never discovered, which kept the outbreak alive after it became definitely established during April and May.

A study of the charts of seasonal incidence of the previous outbreaks in Glasgow which have reached considerable dimensions, shows that their maximum prevalence occurred during the winter months, December, January, and February, with the summit in January, followed by a decreasing and sometimes irregular incidence during spring and summer, with perhaps, as in 1904, a secondary peak in June. It may also be observed that one year of high prevalence never stood alone, but was always followed by outbreaks in immediately succeeding years. The present outbreak is of a type somewhat similar to the flatter curves of incidence of the years 1893 (extending from October, 1892, to January, 1893) and 1895 (from January to July), but its nearest parallel as regards seasonal incidence was the invasion of 1900, when 397 cases sickened between April 21 and December 29, the maximum prevalence being reached in June and July. This was followed in 1901 by a severe outbreak with 1,389 cases, again succeeded by a recrudescence in 1901-02 with 469 cases.

The course of small-pox in the city during the past fifty years may be briefly described. Since the large epidemic of 1871 came to an abrupt end in 1874, the death-rate remained very small (nine per million during 1874-79, nine per million during 1880-84, three per million during 1885-89). There were no deaths for five years between 1887 and 1892. From now on a certain degree of restlessness becomes apparent, and sharp outbreaks occurred in 1893 and 1895 (death-rates thirty-eight and thirty-three per million) which were not confined to Glasgow. In 1894 although only five deaths occurred in Glasgow, there were 129 in Scotland. In 1897 the rate was eight per million, and in 1900 it was fifty-six per million. There was thus a longer period of quiescence lasting about twenty years, followed by a shorter one of about ten years, during the nineties, when small-pox became more active, culminating in the outburst of 1901-02 and succeeding years. Between then and now there has been a period of roughly fifteen years, with an almost entire absence of small-pox, suggesting an analogy with the experience of the years following 1871-74, when its incidence was uniformly low.

It would, of course, be unwise to attempt to make any prediction especially

CHART I.



CONTACT CASES INDICATED THIS - ■

as regards small-pox, but this description of its behaviour during these fifty years gives point to the suggestion made by Dr. Chalmers, that history is repeating itself, and small-pox renewing its activity as it appeared to do in the nineties, and that we are entering on a period of heightened infectivity to which the present outbreak may be the prelude.

ORIGIN OF THE OUTBREAK.

Among the first cases to occur were two adult patients, who were removed to hospital from the centre of the city on March 2 and 3 respectively. They were the parents of a stewardess, who had arrived home on January 25 from Bombay. The vessel had reached the Thames on January 24, and from it, shortly after its arrival, there had been taken to hospital, two patients, whose illnesses were subsequently diagnosed to be small-pox. Although this girl did not herself develop small-pox, and showed no trace of having had even a mild attack, she apparently infected her parents, possibly through the medium of some soiled clothing, which, it was ascertained, had been brought from the ship. The mother of the girl contracted a mild attack—the rash appearing twenty-one days after her daughter's arrival home. The father sickened a fortnight later, and on the second day of his illness attended a race meeting in the East end of the city, just outside of the boundary.

About the same time, a second and apparently independent group of cases occurred in a family living in the Eastern district of the city, about one mile from the small-pox hospital. The first patient, a pit engineman, who also carried on a side business as a fruit hawker, sickened on February 25. He was at work up till the actual day on which his rash appeared, and was so far recovered as to appear in public on the day he was diagnosed and removed to hospital. It will be observed that he was infected at a time when no patients had as yet been admitted to the small-pox hospital. Three members of his family subsequently sickened in the reception-house. All were mild infections.

The succession of cases in the city which followed these two groups chronologically, and which were largely confined to the East end, could not be directly attributed to either of these sources. The circumstances, however, surrounding the incidence of the two groups described were such as to afford ample opportunity for the spread of infection.

About this time also, a third group, the infection of which, like the first, originated abroad, occurred in the S.W. district of the city. A ship's carpenter arrived home on March 13, via Hull, from a ship which had touched at various Mediterranean ports (including Alexandria). Small-pox was known to have occurred on this vessel, a case having been removed at Hull. The patient sickened on the day after arrival, and died the following day after an acute illness of twenty-four hours, in which no rash nor hæmorrhagic symptoms appeared. Four contacts subsequently developed small-pox, and no further cases were traced to this source.

In the meantime, in the Eastern district of the city, four sporadic cases, among whom no direct association with the preceding ones, or with a common source, could be traced, sickened between March 18 and 24. After a further interval of a fortnight, the infection—still clinging mainly to the East end—definitely passed among the general population, and began to give rise to a steady stream of cases. The general features of the rise and progress of subsequent infections are shown in the chart, and the map shows the final incidence which had been reached in the different districts of the city by the

end of the year. The case-rate per million is shown against each ward of the city, and, for convenience, the map is hatched to indicate the broader distinctions of incidence. The three wards, whose case-rates were over 1,000 per million lie in the Eastern district of the city. In the centre of these wards is situated the small-pox hospital which was used for the treatment of the cases up to July 19. It will also be remembered that it was in this area that the outbreak really began. Up to the first week in May, the major incidence fell in the Eastern area of the city; afterwards, cases occurred sporadically in various districts, though still keeping mainly to the district in which the outbreak began, and from which it finally vanished by the end of September.

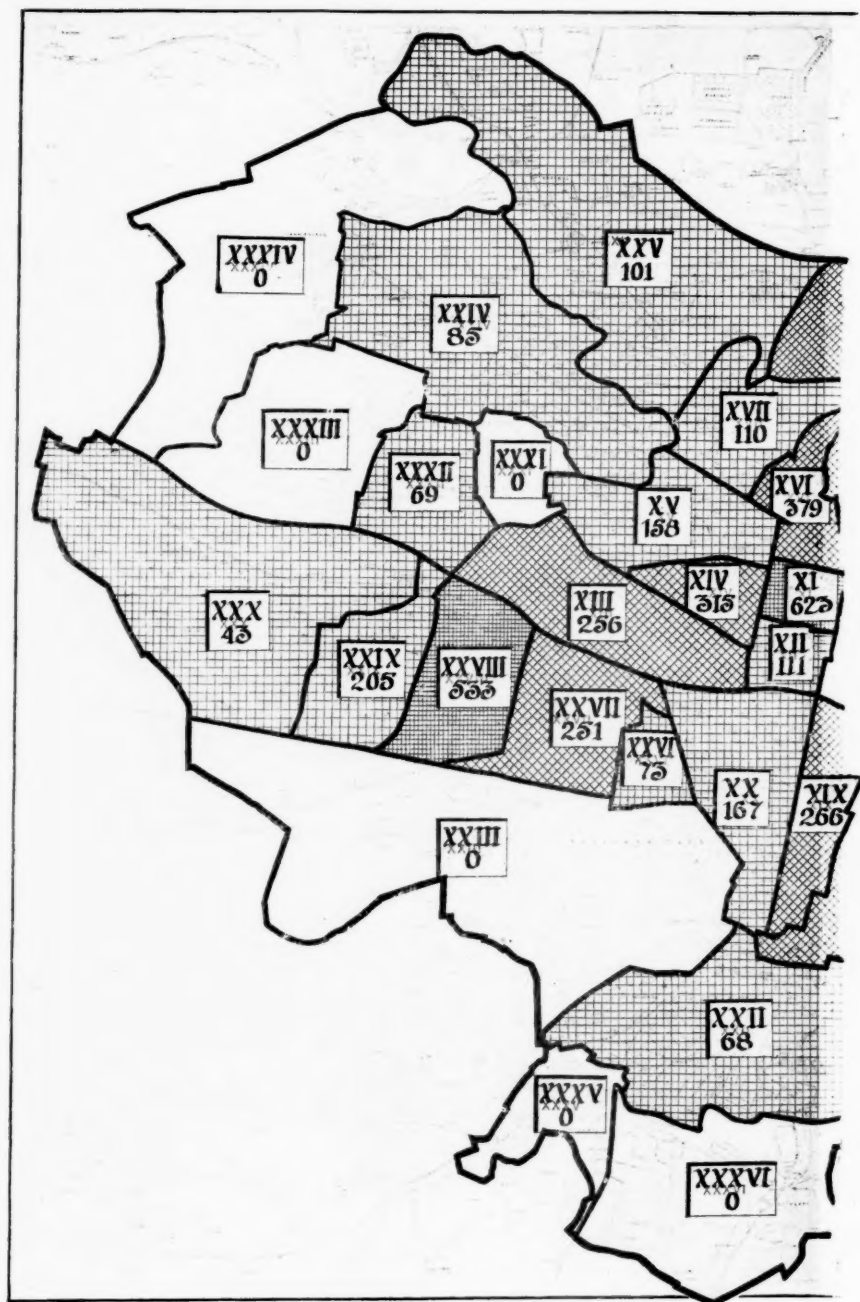
Before discussing the vaccination and mortality statistics, a brief account may be given of such administrative and general features as may seem to be of interest.

ADMINISTRATIVE MEASURES.

(1) *Segregation of Contacts.*—As a general rule removal of the immediate contacts to one or other of the two reception-houses was rigidly enforced. This is a valuable procedure, as it enables thorough disinfection of the house and the personal clothing of contacts to be carried out, as well as affording the best opportunity for the discovery of modified eruptions. During the height of the outbreak, the pressure on the reception-houses led to some relaxation of this practice. Selected families were allowed to remain at home throughout the quarantine period. In other cases, detention for a restricted period was adopted, the criterion for discharge being satisfactory re-vaccination. In all, thirty-six contacts developed small-pox while under quarantine in the reception-houses.

(2) *Notification of Chicken-pox.*—The addition of chicken-pox to the list of notifiable diseases is an essential administrative measure during an outbreak of small-pox. Subsequent to the adoption of this measure in Glasgow on May 1, 1920, thirteen cases of small-pox were notified as chicken-pox. Confusion between these diseases is a common cause of cases being missed, as the following examples show. A family of four were all found to be suffering from small-pox, the cause being an unvaccinated child, aged 2, who had sickened a fortnight previously, the case being twice diagnosed as chicken-pox. Two members of a family were infected by one of the children who had been treated for chicken-pox, and who had in turn contracted small-pox from an adult member of the family, this case also diagnosed as chicken-pox. Both these missed cases had very sparse eruptions. Two unvaccinated children (aged 8 and 11), whose illnesses were regarded as chicken-pox, infected other members of their respective families with small-pox before they were detected. Notification of chicken-pox should, of course, be followed by verification of the diagnosis in certain cases. The practice adopted was to verify where the notified case was over 10 years of age, or if under 10 and unvaccinated. In this way, the thirteen cases of small-pox above mentioned were detected. A difficulty arises where chicken-pox is treated at home without medical aid, but notification of school absentees by the Education Authority greatly assists in reducing it.

(3) *Missed Infections.*—In endeavouring to trace the source of infection in individual cases of small-pox, I have been much struck by the extent to which the continued prevalence of "missed" cases will defeat the best administrative efforts to control the spread of small-pox. Many are discovered in association










MAP OF
GLASGOW
SHOWING THE
STATISTICAL DIVISIONS

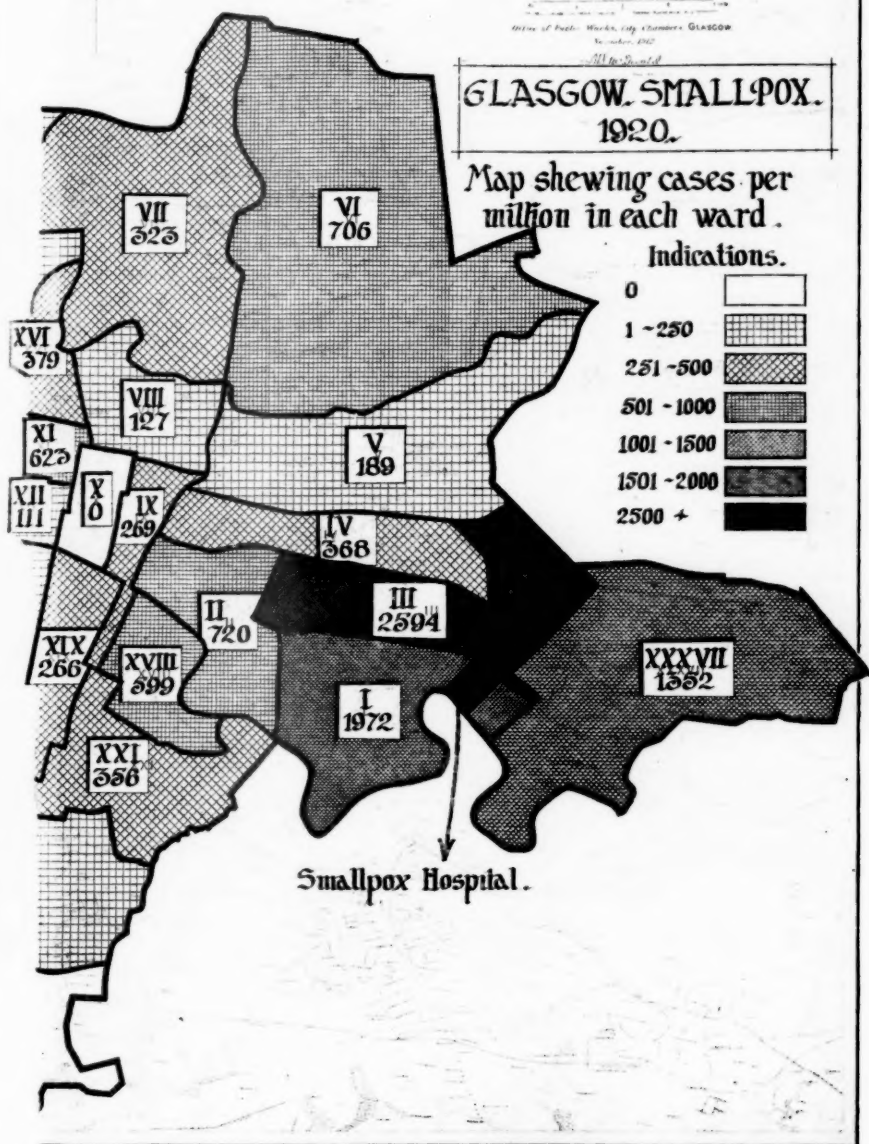
Office of Public Health, City Chambers, GLASGOW.
November, 1920.

GLASGOW. SMALLPOX.
1920.

Map shewing cases per
million in each ward.

Indications.

0	
1 - 250	
251 - 500	
501 - 1000	
1001 - 1500	
1501 - 2000	
2500 +	



with declared cases, but there is little doubt that many others elude the most exhaustive inquiry and search, and are never detected. "Missed" cases arise in various ways. The patient may succumb to a very severe infection before the signs are typical enough to suggest small-pox to the mind of the medical attendant. For instance, of the illnesses of patients of the present series who died at home, one was called uræmia; a second, malignant scarlet fever; a third, miliary tuberculosis. In the others, the true diagnosis was suspected and confirmed just before, or just after death. The really important "missed" case, however, from an epidemiological point of view, is that of the patient who has had a trifling illness, a sparse eruption, and is never laid up, or perhaps only remains indoors for a day or two with a "chill," and who is discovered only when contacts develop recognized small-pox. This type of case is common enough in most epidemics, but it has been so much in evidence during this outbreak that it is thought worth while to give some examples, at the risk of repeating what must be familiar to those who have dealt with outbreaks of small-pox.

(i) Fur-stitcher (aged 26), remains at work, and travels daily by car throughout whole period of illness, for over three weeks.

(ii) Housewife (aged 50), able to go about during most of illness for five weeks. Visited a coast resort while in crusting stage.

(iii) Two members of a family (aged 40 and 72) sicken in succession, the one a fortnight after the other. The one is never ill, and is able to go about freely for five weeks; the other, except for a short period, is able to go about for three weeks.

(iv) Housewife (aged 38), a month ill before detected, goes about freely shopping and to religious meetings.

(v) Woman (aged 34), discovered in fifth week of illness. During illness went freely about public-houses, and was arrested by the police.

(vi) Male (aged 60), discovered with fortnight-old rash during night raid on a model lodging-house. Had continued at work throughout, and had visited a neighbouring town.

(vii) Woman (aged 40), diagnosed on sixteenth day of illness, after moving freely about locality.

(viii) Dressmaker (aged 43), carried on her work as dressmaker for three weeks after onset of rash.

(ix) Male (aged 40), continued at work throughout illness, detected over four weeks after onset.

(x) Girl (aged 25), was never ill, travelled to two towns near Glasgow, and later infected her parents.

The true nature of these cases was not suspected until the patients had given rise to other manifest infections among their immediate contacts, and, but for this, they might have passed undetected altogether. If any explanation of the continued progress of small-pox throughout the city were needed, it is to be found in the existence of cases like those quoted, which are often so mild in character, and whose discovery is so much a matter of accident, that it is difficult to avoid the conclusion that many others are entirely missed, and never come to the knowledge of the Health Department. Aside from this definitely unrecognized and ambulant type there are others whose illness is mistaken for some other affection, and who, while confined to the house for a period, may yet appear in public in an infectious condition. The principal disease with which small-pox is generally confounded is chicken-pox, and the value of making the latter a notifiable disease has been amply demonstrated. Again,

quite a few patients were recognized in medical men's consulting rooms, having been able to visit their doctor during the period of improvement in the symptoms which accompany the onset of the rash. The following table has been prepared to show the time elapsing between the date of onset and removal to hospital, in respect of 518 cases admitted to hospital up to the middle of December.

TABLE II.

Number of days elapsing between onset and admission to hospital						Summarized in weeks	
Days	Cases	Days	Cases	Days	Cases	Week of illness	Cases
1	12	9	2	22	2	First week	489
2	66	10	1	24	2	Second week	13
3	136	11	2	25	1	Third week	6
4	126	14	1	26	1	Fourth week	6
5	73	16	1	29	1	Fifth week	2
6	49	17	1	32	1	Sixth week	2
7	27	20	2	40	1		
8	7	21	2	41	1	Total	518

Although the great majority of patients were thus promptly diagnosed and removed to hospital, there still remained a considerable number detected late in their illness, belonging to the category of "missed" cases described above. It will be noticed that the majority were admitted on the fourth or fifth day of the illness; a few as early as the second day; a considerable number at a time when the pustular stage would be well advanced. Those in whom the disease had been present for over a week before its nature was discovered reach the considerable proportion of 5.6 per cent. of the total cases. This feature of late diagnosis associated with "missed" cases is specially commented upon as characterizing the outbreaks of the years 1892-95, when the proportion of patients who had sickened more than a week before diagnosis was over 8 per cent.¹

(4) *Vaccination*.—When the outbreak threatened to become general, the Corporation decided to meet the cost of providing facilities for the vaccination and revaccination of the whole population, and medical practitioners were invited to vaccinate all comers free of charge. The services of medical men were also enlisted in house-to-house vaccination in the affected areas, in which also a large number of medical students took part. Vaccination centres were opened in various districts of the city. The Education Authority agreed to co-operate, and their medical officers carried out systematic vaccination in the schools in the Eastern districts—an important service, as many school children were thus vaccinated for the first time. The returns up to the end of the year (1920) showed that 225,000² persons had been vaccinated in one or other of these ways—not a large number, when the size of the population, 1,115,000, is borne in mind. This number compares unfavourably with the total vaccinated during the epidemic of 1900-01, when 404,000 persons were vaccinated, or revaccinated, out of a population of 675,887. Unlike the last

¹ Thomson and Marsh, "Report on the Cases admitted to the City of Glasgow Small-pox Hospital, Belvidere, during the Epidemic Outbreak in the Years 1892-95."

² Does not include persons vaccinated "privately," of whom no returns were made by medical practitioners.

epidemic, the present outbreak did not reach such serious dimensions as to break through the apathy of a large section of the population. It has been repeatedly shown that very many persons remain indifferent until danger actually threatens by the presence of the disease in their immediate neighbourhood, or even in their own homes. As soon as the incidence began to diminish the number of vaccinations rapidly fell away, and the continued occurrence of sporadic cases produced little effect. A rough attempt has been made as follows to estimate the proportion of the population who may be regarded as protected by vaccination:—

(1) Known to have been recently vaccinated or revaccinated	...	225,000
(2) Ex-Service men (estimated)	...	100,000
(3) Number of children in the population at 1920, born and vaccinated within ten years...	...	124,000
		<hr/> 449,000

It would appear that a considerable proportion of the 225,000 persons vaccinated as above represents simply arrears of vaccination of children exempted on account of the relaxation of the conscientious objection clause in the 1907 Act, or otherwise not vaccinated. A scrutiny of the returns from the medical practitioners indicates that about 75 per cent. of the persons vaccinated by them were children under the age of 15. Of these also, a proportion were revaccinations. On the other hand, estimating from the Registrar-General's returns of births and deaths and of vaccinations it has been calculated that the city population at the beginning of 1920 contained at least 127,000 unvaccinated children under 15, so that it may be said that the vaccinations carried out do not much more than cover the arrears which have accumulated during the past fifteen years. If we put the total number of children vaccinated and revaccinated at 150,000 there is left 75,000 adults over 15 who have been recently protected. To these may be added 100,000 ex-service men, and 124,000 children born and vaccinated within ten years and remaining alive in 1920. The sum of these three groups is 449,000 which is considerably less than one half of the City population.

That this proportion of recently vaccinated persons is insufficient to protect the city against a possible further severe outbreak among the remainder, or inadequately protected portion, of the population is shown by reference to the facts of the last epidemic.¹ Its main bulk had exhausted itself by July, 1901, when 60 per cent. of the population were known to have been recently revaccinated. A sharp recrudescence of small-pox occurred in November of that year and yielded 469 cases. This was again followed by a further outbreak in 1903-04 when 1,163 cases occurred.

Data bearing on the mortality, age distribution, and vaccination of the cases are given in the following paragraphs; the analysis embraces admissions to hospital from the beginning of the outbreak to the end of November, and includes a few patients sent in from areas just beyond the city boundary (about twenty in number).

During December only fifteen cases were admitted, so that their omission from the tables will not seriously interfere with the accuracy of the statistical results, which may be regarded as reflecting the facts of the outbreak as a whole.

¹ Small-pox Report, 1900-02: Dr. A. K. Chalmers, Medical Officer of Health, Glasgow.

TABLE III.—SMALL-POX, GLASGOW, 1920.

Age group	Vaccinated	Died	Mortality per cent.	Unvaccinated	Died	Mortality per cent.	Vacc. Doubtful	Died	Mortality per cent.	Total Cases	Deaths	Mortality per cent.
0-1	—	—	—	15	11	73.3	—	—	—	15	11	73.3
1-5	1	—	—	32	11	34.3	—	—	—	33	11	33.3
5-10	8	—	—	40	10	25.0	—	—	—	48	10	20.8
10-15	20	—	—	21	5	23.8	1	—	—	42	5	11.9
15-20	61	2	3.3	4	2	50.0	3	1	33.3	68	5	5.9
20-25	42	5	11.9	3	2	50.0	1	—	—	47	7	14.9
25-35	70	4	5.7	3	1	33.3	2	—	—	75	5	6.6
35-45	85	18	21.2	1	—	—	2	1	50.0	88	19	21.7
45-55	75	23	30.6	1	1	100.0	5	3	60.0	81	27	33.3
55-65	27	5	18.5	2	2	100.0	2	1	50.0	31	8	25.8
65+	11	3	27.2	—	—	—	3	2	66.6	14	5	35.7
	400	60	15.0	123	45	36.5	19	8	42.1	542	113	20.8

MORTALITY AND AGE-INCIDENCE IN RELATION TO VACCINATION.

Summarizing Table III (above) the fatality-rate among the vaccinated was 15 per cent., among the unvaccinated 36.5 per cent. and among the group classed as "vaccination doubtful," 42.1 per cent. It has been customary, for the sake of accuracy, to put on one side and class as "doubtful" those patients who cannot show unequivocal evidence of previous vaccination in the shape of a scar or scars, however minute, and who are yet said to have been vaccinated. In the present series, nineteen persons are classified as doubtful, of whom 8, or 42.1 per cent., died, which gives the doubtfully vaccinated a higher case-mortality than the unvaccinated. It will be observed, however, that the great majority of those who died were aged over 45 when they would have completely passed beyond the transient protection afforded by an operation so insufficient as to leave no trace. Reference to the table shows that age for age, the mortality among this group was less than it was among the unvaccinated. Some had no doubt been vaccinated in infancy, and others had probably never been vaccinated. They could not as a group, be justly included among either the vaccinated or unvaccinated, and for the sake of strict veracity are best kept separated from either of these groups. In any case, their number is too small to sway the figures by any considerable fraction, one way or another.

It will also be observed that no vaccinated patient under 15 years of age died and that there were only two deaths among the sixty-one patients between 15 and 20 years of age; over 35 years of age the fatality among the vaccinated class rose appreciably. On the other hand the unvaccinated suffered severely at all ages, especially children in their first year of life, of whom 73.3 per cent. died. The mortality-rate among unvaccinated children under 15 years was 34 per cent.

The table also shows that in the unvaccinated class a much higher proportion were children than was the case among the vaccinated. The following comparison with the experience during 1900-01 indicates that this was an even more decided feature of the 1920 outbreak.

TABLE IV.—SMALL-POX (GLASGOW, 1900-01 AND 1920).

Percentage of Children under 15 years in the Vaccinated and Unvaccinated groups.

Percentage under 15 ...	...	Vaccinated		...	Unvaccinated	
		1900-01	1920		1900-01	1920
Percentage under 15	7.7	7.2	...	65.6	87.8
" over 15	92.3	92.8	...	34.4	12.2

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Small-pox is thus to a greater degree a disease of childhood than it was during the last epidemic.

The general mortality-rate of 20·8 per cent. may be compared with that of 13·1 per cent. during the epidemic of 1900-01. The following table gives, for the two periods, the relative rates in relation to vaccination :—

TABLE V.

	GLASGOW, 1900-01			GLASGOW, 1920		
	Cases	Deaths	Mortality per cent.	Cases	Deaths	Mortality per cent.
Vaccinated in infancy ...	1,642	150	9·1	400	60	15·0
Unvaccinated ...	122	63	51·6	123	45	36·5
Doubtfully vaccinated ...	46	25	54·3	19	8	42·1
Total ...	1,810	238	13·1	542	113	20·8

This table at first sight appears to show that the present outbreak as compared with the former has been more severe among the vaccinated and less severe among the unvaccinated. But before so concluding, it is necessary to inquire whether differences in age-distribution as between the two epidemics might not account for this result.

The severity of outbreaks of small-pox is usually gauged by the mortality-rate, which varies in accordance with the vaccinal state and age-distribution of the persons attacked. It would seem advisable, therefore, in comparing one outbreak with another as regards relative severity, to have regard to these factors, and to make the necessary corrections in respect of age-distribution and vaccination. This procedure will be the more essential in contrasting present with past epidemics, especially in view of the altering composition of the population now exposed to risk, due to the presence in it of a relatively high proportion of unvaccinated children. These considerations have been kept in mind in comparing the present outbreak with those of 1900-01 and 1871-72 in Glasgow, and that of 1887-88 in Sheffield. That is to say, the number of deaths which would have occurred at each age-group among vaccinated, unvaccinated and doubtfully vaccinated persons have been calculated for each of these epidemics on the basis of the age and vaccination distribution of the cases in the 1920 Glasgow outbreak, and have been utilized in the calculation of "corrected" mortality-rates. The general results of this inquiry are as follows :—

TABLE VI.

Comparison with former Epidemics : Actual and Calculated Mortality Rates compared.

	VACCINATED :		UNVACCINATED :		DOUBTFULLY VACCINATED :		Total cases	
	Mortality rates		Mortality rates		Mortality rates		Mortality rates	
	Actual	Calculated	Actual	Calculated	Actual	Calculated	Actual	Calculated
Glasgow, 1920 ...	15·0	15·0	36·5	36·5	42·1	42·1	20·8	20·8
" 1900-01 ...	9·1	11·7	51·6	43·1	54·3	26·3	13·1	15·3
" 1871-72 ...	8·0	6·9	31·2	35·1	23·2	11·3	15·4	14·1
Sheffield, 1887-88 ...	4·9	7·7	32·6	38·2	—	—	9·7	14·6

This comparison shows that the 1920 outbreak in Glasgow has been somewhat more severe than those with which it is compared, although not quite

to the extent which the actual rates at first sight suggest. The striking difference between the actual and calculated rates for Sheffield is only partially explained by the fact that the disease attacked a smaller proportion of children in Sheffield than it did in Glasgow. (In Sheffield 12 per cent. of the patients were aged under 10 as compared with nearly 18 per cent. in Glasgow.)

The table also shows a tendency for small-pox to be more severe among the vaccinated, while among the unvaccinated the rate is slightly lower than it would have been in 1900-01, otherwise natural small-pox in this as compared with these previous outbreaks has much the same severity. As regards the doubtfully vaccinated class the number of cases are too small for any deduction to be made. In the Sheffield epidemic no similar group appears in the data.

The difference between the total rate for 1920 and the calculated rates for the other epidemics is very uniform, and may be explained by the larger proportion of unvaccinated children attacked in the present outbreak. These data would appear to suggest that the severity of the disease has not altered much, at least as regards the particular years contrasted.

The relaxation of the vaccination laws in 1907 has been largely taken advantage of in Scotland. Since that year the proportion of unvaccinated children has been gradually increasing, resulting in the exposure to infection of the more susceptible younger ages of the population. As might have been expected, and as the event showed, the present invasion of small-pox has tended to fall more heavily than formerly upon the unvaccinated.

The following data show the general trend of the relationship of age to fatality during several epidemic periods in Glasgow.¹

TABLE VII.

Proportion of deaths	1855-57	1870-72	1900-01	1920
Under 10 years of age ...	88.8	38.5	16.4	28.3
Over 10 years of age ...	11.2	61.5	83.6	71.7

This table, which shows a distinct tendency for the proportion of deaths at the younger ages to increase, should be read in conjunction with the following one (*see* Table VIII, p. 56), which sets out the diminishing proportion of primary vaccinations in Glasgow between 1902 and 1918. In the years prior to 1907 the percentage of successfully vaccinated children remained fairly constant, at an average of about 84 per cent. Since then, the percentage has rapidly decreased, until by 1918 it had reached the low figure of 54.4 per cent., while the proportion of statutory declarations had risen to 26.6 per cent.

SEVERITY OF ATTACK IN RELATION TO VACCINATION.

Tables showing the severity of attack in patients at different age-periods in relation to vaccination have been prepared, based on the hospital classifications which divides the cases into grades of severity in accordance with the abundance and nature of the rash, i.e., whether discrete, abundant, confluent or hæmorrhagic. The results are summarized here as follows (*see* Table IX, p. 56).

¹ Small-pox Report, 1900-02: Dr. A. K. Chalmers, Medical Officer of Health, Glasgow.

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TABLE VIII.*—GLASGOW.

Table showing Results of Primary Vaccination of Children during several years.
(From the Detailed Annual Reports of the Registrar-General.)

Year	Successfully vaccinated Per cent.	Insusceptible of vaccine disease Per cent.	Died before vaccination Per cent.	Conscientious objection to vaccination Per cent.	Vaccination postponed Per cent.	Unaccounted for Per cent.
1902	84.2	0.9	10.6	—	0.8	3.5
1903	84.6	0.6	10.8	—	0.7	3.3
1904	83.4	0.7	11.0	—	1.2	3.7
1905	84.5	0.6	10.0	—	1.3	3.6
1906	82.9	0.5	10.6	0.2	0.8	5.0
1907	75.0	0.7	10.7	4.9	1.5	7.2
1908	69.5	0.8	10.8	9.2	1.7	8.0
1909	67.2	0.8	10.6	12.6	1.7	7.1
1910	64.8	0.5	9.8	16.0	1.6	7.3
1911	65.2	1.2	12.0	11.8	1.5	8.3
1912	57.3	0.6	10.4	22.0	1.8	7.9
1913	54.7	0.6	10.6	24.9	1.6	7.6
1914	51.7	0.9	12.1	25.1	1.8	8.4
1915	56.2	0.6	10.0	24.9	1.8	6.5
1916	55.2	0.7	9.7	26.6	2.1	5.7
1917	55.2	0.9	9.7	27.3	2.2	4.7
1918	54.1	1.0	10.0	26.6	2.5	5.5

Note.—1917 and 1918 figures are based on the number of births in the whole City, and the figures for previous years on the births for the whole Registration Districts within it.

* Annual Report of Medical Officer of Health, Glasgow, 1914-19.

TABLE IX.

Showing Severity of Attack and Mortality in Vaccinated and Unvaccinated Patients.

Eruption	VACCINATED				UNVACCINATED			
	Number of cases	Died	Case mortality	Percentage in each group	Number of cases	Died	Case mortality	Percentage in each group
Sparse ...	221	2	0.9	56.5	15	—	—	12.3
Abundant ...	113	9	8.0	28.5	50	11	22.0	41.0
Confluent ...	34	21	61.8	8.7	48	24	50.0	39.3
Hæmorrhagic ...	25	25	100.0	6.3	9	9	100.0	7.4
	396	57	14.4	100.0	122	43	35.5	100.0

This grouping indicates that the character of the eruption is a good index of the severity of the disease, and that the severer types prevail much more frequently among the unvaccinated, than among the vaccinated. While the most severe hæmorrhagic type occurred with much the same frequency in both groups, a much larger proportion of the vaccinated contracted the disease in its milder form, and conversely the more severe forms prevailed to a greater extent among the unvaccinated. This difference in severity is strikingly shown when children and adults are compared.

TABLE X.

Showing Severity of Disease in Relation to Age and Vaccination.

	VACCINATED			UNVACCINATED		
	Number of cases	Severe	Percentage of severe cases	Number of cases	Severe	Percentage of severe cases
Under 15 years ...	29	1	3.4	107	45	41.1
Over 15 years ...	367	58	15.8	15	11	73.3
	396	59	14.9	122	56	46.0

In this table the most severe types (the confluent and hæmorrhagic) are combined and expressed as a percentage of the total cases admitted to hospital under and over 15 years of age. The result illustrates in a very striking way the behaviour of small-pox in vaccinated and unvaccinated persons. Among children under 15 years of age, of twenty-nine who had been vaccinated, only one had a severe attack and none died; of 107 who had not been vaccinated, forty-five contracted severe attacks and thirty-seven died.

HOSPITAL INFLUENCE.

It has been pointed out that the Eastern district of the City bore the brunt of the outbreak and that the wards which had the highest case-rate throughout the year were the three city wards adjoining the small-pox hospital.

In his report on the epidemic of 1900-02 Dr. Chalmers quotes figures to show that in each year since 1892 when small-pox was present in the city, the proportion of cases contributed by the Eastern district was uniformly in excess of the proportion of the population residing there. A similar aggregation of cases was observed during the early seventies round Parliamentary Road Hospital in the centre of the city. It appears, therefore, that this outbreak repeats the experience of former years and again raises problems concerning the influence of small-pox hospitals which have been so often discussed.

One or two general observations on the course of the outbreak in the Eastern district of the city may be made. It was among the population in this part of the city that the outbreak commenced. The first case whose source could not be traced occurred at Bridgeton Cross (which is only a mile from the hospital and is a centre around and towards which approximately 100,000 of the population may be said to gravitate) and was infected at a time when no patients had as yet been admitted to the hospital. This was the man who, it will be remembered, appeared in public with his rash fully developed. The next untraced cases were four who became infected approximately between March 6 and 12, when there were in hospital not more than three patients. The residences of these four patients in Tollcross and Parkhead were distant from the hospital between one and one and a half miles. It cannot, therefore, be said that the hospital was responsible for originating the outbreak in its vicinity. The disease spread, however, principally in the East End, and by the middle of April a steady stream of patients was being admitted.

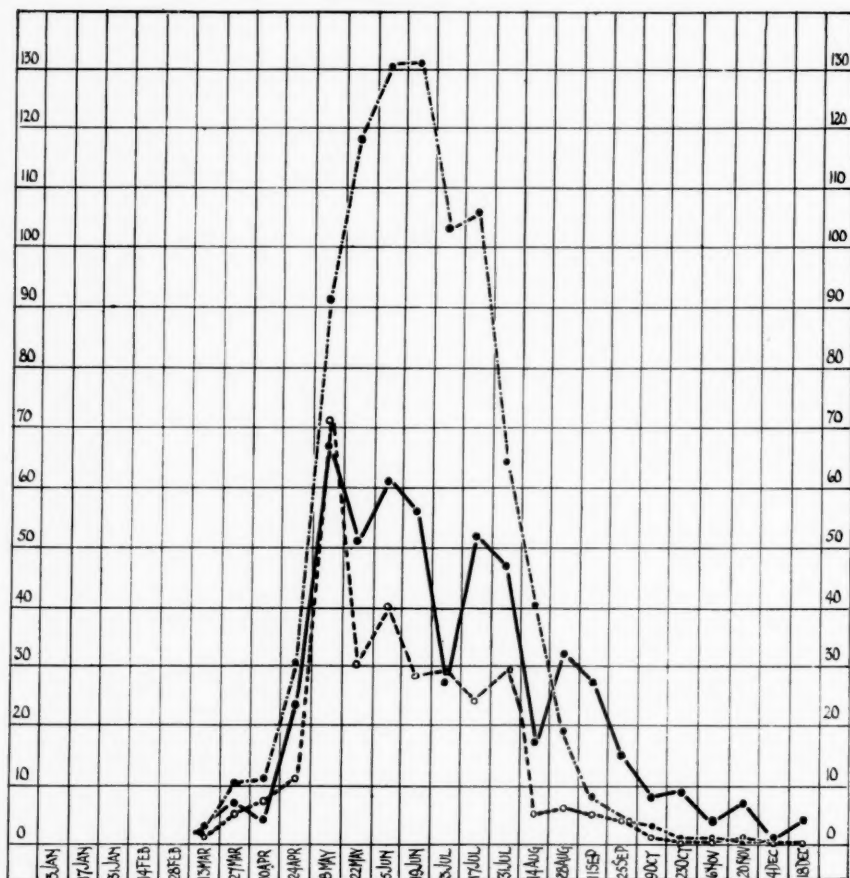
Spot maps have been prepared to show the distribution of cases in the infected area. The progress of the outbreak in time can also be traced from the fortnightly figures of incidence given in Table XI, and also from Chart II, where the events which took place within one and a quarter miles of the hospital are compared with those for the city as a whole. It will be observed that a sharp rise took place in the incidence of cases occurring within the specified distance from the hospital at the end of April and the beginning of May, and that the curve thereafter bore much the same relationship to that for the whole city except in its earlier and more sudden termination. The information afforded by spot maps, as also estimates of incidence in given areas based on them, should not be regarded too closely, as the spots simply indicate addresses from which patients are removed. Were it possible to indicate the actual locus of infection in all cases, spot maps would of course assume quite a different aspect.

There was undoubtedly ample opportunity for the spread of infection by direct contact, for there appeared to be a good deal of accidental exposure

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by infected persons. Reference has already been made to the occurrence of "missed" infections and to the appearance in public of patients after the rash had fully developed. It was in this way that several cases presented themselves as out-patients in doctors' consulting rooms, one or two even making their own way to the hospital gate. Small groups of cases occurred from time to time in connexion with a work or factory, under circumstances suggesting

CHART II.



Smallpox, Glasgow, 1920.

Chart showing:—

- (1) Number of cases sickening in whole city, —
- (2) Number of cases sickening in 1½ mile radius, - - - - -
- (3) Number of cases in hospital, - · - · -

Occurring in fortnightly periods.

the presence of a missed case or cases. The picture house is a new and probably considerable factor in the spread of infection, and visits to these were the commonest item appearing in the records of patients' movements before sickening.

These considerations should be kept in mind in endeavouring to estimate whether the presence of the small-pox hospital in the vicinity was or was not a sufficient cause for the spread of the outbreak in the Eastern district of the city. The following table gives the cases sickening in houses within a radius of one and a quarter miles from the hospital and the total cases in the city, for each fortnight, along with the number of patients in hospital at the end of each fortnight :—

TABLE XI.—SMALL-POX (GLASGOW), 1920.

Fortnight ending		Number of cases sickening			Number of patients in hospital—Belvidere		
		Whole City	Within 1½ mile radius of Small-pox Hospital				
March	13	...	3	...	1	...	2
"	27	...	7	...	5	...	10
April	10	...	4	...	7	...	11
"	24	...	23	...	11	...	30
May	8	...	67	...	71	...	91
"	22	...	51	...	30	...	118
June	5	...	61	...	40	...	130
"	19	...	56	...	24	...	131
July	3	...	27	...	29	...	103
"	17	...	52	...	24	...	106
"	31	...	47	...	29	...	64*
August	14	...	17	...	5	...	40
"	28	...	32	...	6	...	19
September	11	...	27	...	5	...	8
"	25	...	15	...	4	...	4
October	9	...	8	...	1	...	4
"	23	...	9	...	—	...	3
November	6	...	4	...	—	...	—
"	20	...	7	...	1*	...	—
December	4	...	1	...	—	...	—
"	18	...	4	...	—	...	—
"	31	...	11	...	—	...	—
			533		297†		

* July 19: No further patients admitted to Belvidere; Robroyston Small-pox Hospital opens.

† A few cases which occurred outside the city boundary but within the radius are included.

In this table data are given on which to compare the behaviour of small-pox within a given distance from the hospital, with its progress throughout the city and with the concentration of cases in the hospital. It will be noted that during the fortnight ending May 8 there was a sudden increase in incidence within the special circle from eleven to seventy-one cases. These seventy-one cases would have become infected during the previous two weeks, at a time when the numbers in hospital varied from eleven to thirty. On the other hand, the next three fortnights show a decided fall in cases from the vicinity of the hospital, while the concentration of patients in the hospital was rapidly increasing, and while the total cases in the city were not showing any tendency to diminution. The events which followed the closure of the hospital in the Eastern district to further admissions on July 19 are interesting. During the fortnight ending August 14 there was a sharp fall in cases from within the special circle. By then the outbreak in the immediate vicinity of the hospital had practically died out, although the hospital still retained considerable numbers of patients, the majority convalescent, but still many in the crusting stage.

These considerations do not suggest that the influence of a small-pox hospital on the surrounding neighbourhood is one of any great magnitude or that it operates to any extent by means of aerial convection from the hospital itself. The outbreak in the vicinity of the hospital rapidly increased to a maximum during the fortnight ending May 8, a sudden drop took place during the next fortnight; for two months its incidence tended to fall slowly and a second marked drop occurred during the fortnight ended July 31, after which there were only a few sporadic cases. It may be argued that had the course of this group of cases depended to any great extent on the influence exerted by the hospital in their midst, some more definite relationship to concentration of cases in hospital would have been manifest in the curve of incidence, especially during May when the infectivity of the disease was apparently at its highest. Indeed, it appears as if this outbreak proceeded more in accordance with an epidemic law than in obedience to any other extrinsic influence and that its rise and progress near the hospital may have been simply an accident of location.

There remains, however, to be considered the important fact that the closure of the hospital to further admissions on July 19 was succeeded by a drop during the fortnight ending August 14 to five from twenty-nine during the previous period, in the cases admitted from the immediate vicinity of the hospital. In fact this fall practically marked the extinction of the epidemic in the Eastern district of the city. It would not be quite fair to assume that these two facts are directly related, because by that time the close and special attention which the Eastern district of the city received during the vaccination campaign (described in a previous section) would no doubt be having a sensible effect in reducing the proportion of susceptible persons in the population, as compared with other districts where a house-to-house canvass was not wholly carried out as it was in the East End. A scrutiny of the vaccination returns pertaining to the district in question shows, however, that not more than 30 per cent. of the population were vaccinated or revaccinated during the outbreak, which cannot therefore be said to have ceased for lack of material. There are thus two possible explanations for the final behaviour of small-pox in the East End. It either came to a natural termination or the hospital suddenly ceased to create foci of infection. Which of these may have been the determining factor or whether both operated in different degree it is impossible to say.

The continuance of the outbreak in other districts of the city after it had greatly diminished and finally ceased altogether in the Eastern district, following upon the closure of one hospital and the opening of another, certainly suggests that a small-pox hospital may play some part in fostering a prevalence in its neighbourhood, but if this be so, by what precise means and to what extent is not clear. It has been suggested that the influence of a small-pox hospital may be in some measure related to its activity in regard to the admission of cases. The data given above have tended to negative any gross relationship between the course of the outbreak near the hospital and the massing of cases in it, and the same criticism would apply to the theory of admission traffic, as having any marked effect in determining the aggregation of cases in the vicinity.

Further, if traffic has any share in the matter, it would appear that the carriage of infected patients and the transport of infected clothing do not involve similar risks, as, while patients ceased to be admitted to Belvidere after July 19, no change was made in the destination of infected clothing, which is still conveyed to the wash-house there for disinfection.

In conclusion, the evidence disclosed by the facts of this outbreak does not enable the factors influencing its course to be clearly differentiated and the question is still left indeterminate. It may be that the influence of the hospital in this case was entirely negative. On the other hand there is some evidence that the termination of the outbreak round the hospital may have had some relation to the sudden cessation of admissions.

Cases occurring after July 19 were sent to the Small-pox Hospital at Robroyston, which is well isolated and situated fully three miles from any large group of the city population. No further outbreak of the disease has occurred of sufficient magnitude to test the effect of this new policy on the incidence of the disease in the city, but should small-pox recur in future years an excellent experimental test will be able to be made in comparing the new conditions with the old.

SUMMARY.

(1) Viewed historically, the present outbreak in Glasgow belongs rather to an inter-epidemic than to an epidemic period. Its progress has had distinct similarities to the outbreaks of small-pox in the nineties, with their flat curves of incidence, irregular wavelike progression, and comparatively low infectivity. The undulatory character of the wave of incidence has been a very striking and peculiar feature of this invasion.

(2) The general mortality-rate of 20·8 per cent. indicates a severity which characterizes the Eastern more than the Western type of the disease.

(3) Compared with the epidemics of the last fifty years, children contributed a higher proportion of the cases and of the deaths. The percentage of deaths under the age of 10 to total deaths has risen from 16·4 per cent. in 1900-01 to 28·3 during the present outbreak. This, as might have been expected, is a direct result of the decline which has taken place in the practice of infant vaccination since 1907.

(4) The behaviour of small-pox among those who had been vaccinated in infancy and those who had not may be expressed as follows: The unvaccinated had a death-rate of 36·5 per cent., as against 15 per cent. among the vaccinated. Among children under 15 years of age, of twenty-nine who had been vaccinated in infancy, only one had a severe attack, and none died; of 107 who had not been vaccinated, forty-five contracted severe small-pox and thirty-seven died.

(5) In comparing the severity of one outbreak with another it will be necessary to take into account the alteration in age-incidence which is taking place and make corrections accordingly.

(6) The distribution of the cases in the Eastern district of the city again raises the question of the influence of a small-pox hospital in causing an aggregation of cases in its vicinity. The facts of the present experience of small-pox do not demonstrate to what extent the hospital influenced the incidence round it, nor do they clearly indicate by what means infection may have been conveyed to the surrounding neighbourhood. The problem is still left undetermined.

DISCUSSION.

Dr. R. J. REECE said that the stewardess who was associated with one of the first foci of infection in Glasgow landed at Tilbury on January 24, 1920, from a vessel that had arrived from Bombay and that she proceeded to Glasgow the same day. On that day another stewardess from this vessel was admitted to the Orsett Infirmary as a case of influenza, and on January 26 she was found to be suffering from small-pox and removed to the small-pox hospital. The infection of the disease was probably acquired at Suez or Port Said. In the case of the ship's carpenter, who developed small-pox in Glasgow, he arrived on board a vessel in the Port Sanitary District of London on February 28. This vessel left Alexandria on February 12, and on February 23 a fireman developed the rash of small-pox. The vessel went on from London to Hull, where the crew were paid off, when the carpenter, who had declined vaccination, proceeded to his home in Glasgow. Dr. Reece also said that the fact that the first cases of small-pox occurred in the neighbourhood of the Belvidere Hospital could not be considered as excluding any hospital influence subsequent to the time when the first acute cases of the disease were admitted to this hospital. In this connexion it would be useful to know in how many cases the source of infection of persons living within a quarter and half a mile radius of the hospital had been traced, and whether there was any gradation of intensity of invaded houses from the hospital taken as a centre. It was probable that it would not be possible to determine whether the removal of the cases to the small-pox hospital outside the city or the waning of the epidemic prevalence was responsible for the fall in the notification of cases of small-pox in the neighbourhood of the hospital. Still, in view of previous occurrences elsewhere, the disuse of the Belvidere Hospital in this instance could not be disregarded as having influenced the result observed. It would be of interest to know whether any cases of small-pox had occurred among the "fever" patients under treatment, and whether "fever" patients, discharged from hospital as convalescent, had developed small-pox after return to their homes, and if the administration of the small-pox side of the hospital had been completely separate from the "fever" side. The fatality-rate observed was high, but it must be remembered that the infection was originally introduced from the East. In a recent outbreak of small-pox in South Lancashire some eighty cases, all mild in character, had occurred; none of the patients had died. The outbreak originated in mills receiving cotton from America, and the circumstances were consistent with infection having been introduced by means of the cotton.

Dr. G. S. BUCHANAN said that from a practical point of view it was important to note the value of imposing compulsory notification of chicken-pox during this outbreak in Glasgow. It was not always evident that chicken-pox notification was useful, but if in this case a number of small-pox cases were detected as a result of notification—cases which would not otherwise have been ascertained by the doctor asking the Medical Officer of Health to help to clear up a doubtful diagnosis—the measure was fully justified. The vaccination figures in the main corresponded with general experience. While showing the usual contrast in severity between vaccinated and unvaccinated, however, they also pointed to a less degree of protection at the younger ages than was generally found in the vaccinated class. Was this to be correlated with the very high figure of "insusceptibles" in the official returns? Much certifying of insusceptibility carried with it much ineffective vaccination of those certified as successfully vaccinated. The influence of the hospital in spreading the epidemic in this case seemed difficult to determine. Evidently the fact that the very first cases appeared in houses near to the hospital could explain a part of the subsequent concentration of cases in its neighbourhood without making it necessary to consider "hospital influence." Again, though the drop in the cases occurring near the hospital, which began as soon as small-pox cases ceased to be admitted there, was suggestive, the time of year was one in which one would expect small-pox in any event to be falling. But when all this was allowed for, there seemed to be no reason to exclude "hospital influence" as one of the operating causes. It was a familiar occurrence when small-pox cases were admitted to hospitals in populous neighbourhoods; and if it had occurred in this instance it would

be only a repetition of what had happened near many other small-pox hospitals, including the London Small-pox Hospital Ships in Long Reach, the influence of which in spreading small-pox on the Essex shore of the Thames estuary—in areas completely cut off from communication with the hospital ships—was fully described to the Epidemiological Society, and discussed, in 1904-5.¹ The removal of all small-pox cases out of Glasgow altogether was obviously the right course.

Dr. S. MONCKTON COPEMAN, F.R.S., said that he would be glad of information as to the number, if any, of the recently vaccinated cases who had contracted small-pox; and especially as to whether any patients in this category had died of the disease. The President had informed him privately, that a number of the vaccinations, carried out during the progress of the outbreak, had resulted in a septic condition of the arms, accompanied by a fairly high temperature; a fact not improbably due, in part, at any rate, to the high bacterial content of much of the trade lymph employed, as proved by laboratory tests of certain samples. The term "glycerinated lymph" originally devised as descriptive of small-pox vaccine prepared in accordance with the method, introduced by himself, for the bacteriological purification of vaccine lymph, had unfortunately been adopted by manufacturers of this product, who apparently took no precautions to determine whether the material they supplied was properly so described. He gathered, indeed, that much of the vaccine lymph purchased and used during the outbreak in Glasgow had turned out to have been of foreign origin, with regard to which no information was obtainable as to its having been submitted to tests in respect of potency or of freedom from "extraneous" micro-organisms.

Dr. A. F. CAMERON said that he was particularly interested in the remark made on the influence of the vaccination carried out during the war on the incidence of the disease because he was inclined to think that the comparative immunity from the disease which London had so fortunately experienced, during the last few years, had to a considerable degree depended on this factor. War vaccination affected the adult male section of the population. It was reasonable to suggest that this section contributed most to the spread of the disease because it had a much wider range of movement than the other sections of the population. Reference had been made to the high fatality of the outbreak in Glasgow and it had been suggested that this feature might be associated with the source of the infection. He was not inclined to attach much importance to the suggestion. During the year just ended the case mortality in the Metropolitan Small-pox Hospital had been 14 per cent. notwithstanding the fact that the majority of the cases were drawn from districts east of London where difficulty was experienced on account of the large proportion of mild and anomalous eruptions met with, a condition generally assumed to be a characteristic of the American type of the infection. At the same time it should be noted that the 14 per cent. fatality was calculated on a total of fifty cases treated. Being in charge of a small-pox hospital, he was naturally most particularly concerned in the question of hospital influence. For one in his position it was impossible not to regret the apparent decline in the importance assigned to the direction of the wind and atmospheric conditions generally as factors in the spread of the disease from the hospital, because the inevitable result was that greater attention would come to be directed towards defects in the administration of the hospital, of which instances of leakage of infection would be regarded as evidence. But even direct leakage of infection was very difficult to prevent. The preventive regulations made by the Metropolitan Asylums Board were very strict and rigid. All staff, with the exception of the medical officer, were required to remain in the hospital for a period not exceeding three months. An incident which had occurred a few years ago illustrated the difficulty. While the hospital was occupied a child in the neighbouring town got small-pox. It was the only case in the vicinity. The child had the same name as a stoker employed in the small-pox hospital who denied all knowledge of the existence of any relatives in the town. It was proved that the child, with companions, had been on the river bank just outside the hospital fence about the date of infection, and later, that the father of the patient and the stoker were related,

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and probably brothers. But the actual means of transmission of the infection was never discovered. In view of this and many similar experiences of the difficulties encountered in trying to prevent the leakage of infection from the hospital under very strict conditions such as he had described, he was very interested to hear that small-pox cases were treated in Glasgow in close proximity to cases of other fevers in the hospital, and it would be interesting to know what precautions were taken in regard generally to the administration of the small-pox section of the hospital, and in regard particularly to the movements of the staff employed in that section.

Section of Epidemiology and State Medicine.

President—Dr. A. K. CHALMERS.

Collated Experiences of Plague on Shipboard.¹

By W. M. WILLOUGHBY, M.D.

AT this date and with the varied experiences here set out, the matter of plague on shipboard seems to be one of growing simplicity, the later experiences running in the grooves which the earliest ones suggested.

The channels of human infection may be inferred from a consideration of the aetiology of the disease. As regards aetiology the following are axioms:—

(1) The bubonic form of plague is hardly infectious from person to person in the absence of fleas.

(2) Human plague is initiated in a rat infection.

(3) Plague spreads to the human being from fleas of dead rats.

(4) Rats of necessity live in proximity to food.

The data are quite simple, they are fundamental. Some ten years ago I had occasion to say, "Excuse me, sir, you are standing on a rat." The rat had only been two hours dead, but several other dead had been taken from the same corner—a rat warren, an old cesspool filled in with loose bricks, and these covered with the chaff and other droppings from a grain elevator belt which ran above it—some hours previously. Axiomatically this was a dangerous corner; within a few days the interested examiner of this spot was down with a right maxillary bubo. A little later on, one Monday, a disinfecter worker told me that the disinfecting shed was leaping with fleas and that he had been badly bitten; four days after this complaint he presented a left maxillary bubo, very painful, very diffuse, and accompanied by high fever. Both were comparatively mild cases of plague; both were convalescent in less than a week.

A few days before the disinfection out of which the case in the disinfecter worker arose, a man was brought to me on a ship, suffering from a femoral bubo; on search, his leg showed no septic point nor sign of recent sepsis and he was ill; he was removed as a case of suspected plague on my hearing that there was a rat mortality on the ship. Microscopic evidence was obtained in this case forthwith.

Dead rats, and a bubo otherwise unaccountable and accompanied by illness in a human being, seemed to be the simple indication of plague occurring in non-epidemic regions.

The duties of the patient in the last case led him into No. 1 hold of his ship in which there was a rat mortality. The food stores, of which he had the handling, were disposed in a space separated off by battening only from the hold proper.

Three days previously to the occurrence of this case, a man from another ship had died of plague. The ships belonged to the same company—there had

¹ At a meeting of the Section, held April 22, 1921.

been found on discharge a rat mortality in the No. 1 hold of either ship; the second ship had taken grain cargo from the same pile as the first at Bombay, and this fact is the only possible connexion between the two cases on the two ships. Thus it seemed that foodstuffs carried as cargoes from an infected port should render a ship suspect of rat infection, and that the man whose duty it is to handle the foodstuffs in the food stores of an infected ship is of the whole crew the most liable to come into contact with dead rats and their living fleas and acquire the infection.

I have unfolded the subject as it presented itself to me then, in the light of a few experiences and a close study of the reports of the Indian Plague Commission.

The essential connexion between food and rats had its ample illustration in every part of the world during the war. It was the Ministry of Food which, in consequence of rodent depredation, issued the Rat Orders of 1918, 1919, and these orders were the precursors of the Rats and Mice Destruction Act. During the late war and early after-war period food stocks were stored everywhere and anyhow, in the absence of bottoms to carry them for distribution or against emergencies. Ships were heavily provisioned either for transport of troops or with a view to protracted voyages and the avoidance of provisioning in places where food might be hardly obtained.

If plague, food and the rat be considered together, on theoretical grounds the late threat of plague invasion in various parts of the world and in England is accounted for. Rats were everywhere increased in number by the unwonted food storage. Thereby endemic centres of plague were rendered more dangerous, ships more communicative and the wide world, especially at its ports, more receptive. During 1917-18-19-20, eight ships brought plague infection into the Port of London, and afforded the opportunity for comparisons here laid before you.

Vessel	Number of cases	Rating of first case	Complement
(1) <i>Sardinia</i> ...	7	European storekeeper	209
(2) <i>Motiana</i> ...	9	Lascar	—
(3) <i>Somali</i> ...	4	European storekeeper and assistant (cat)	469
(4) <i>Hector</i> ...	5	Gunner (storekeeper and assistant later)	59
(5) <i>Japan</i> ...	4	Lascar ? (cat)	399
(6) <i>Clon Lamont</i> ...	1	Steward	77
(7) <i>Nagoya</i> ...	7	Storekeeper and assistant	413
(8) <i>Alps Maru</i> ...	2	Storekeeper	89

I present a list of successive plague-infected ships showing how prone to attack is the food storekeeper. The ship's name, the number of cases occurring on board, the rating of the first case and the total complement, are given. By "storekeeper" is intended to mean that person who went regularly into the store room for the purpose of distribution of rations. In the ships numbered 1 and 3 this man was a white officer, in numbers 7 and 8 he was a Lascar and native of Japan respectively. Ship number 4 is an exception in that the storekeeper was not the first man down but as will be seen later he was in this case not the person most intimately associated with the food store. You will recall how the provision merchant in Ainsworth's "Old St. Paul's" shut himself in with his stores to avoid the plague—under the circumstances an incorrect procedure, but fictionally successful.

Here, out of over 1,715 persons presumably exposed, with thirty-nine cases of plague, no less than eight of the cases occurred in food storekeepers and their assistants.

It is obvious that the food store is a potential focus of danger, and it

will be interesting to examine the location of the store on some of the ships affected in connexion with the berthing of the cases of plague.

The following are the circumstances of the *Somali* infection: The ship had a complement of 469 souls. Out of these the disease selected in succession the storekeeper, the storekeeper's assistant, a lavatory attendant and an engineer. The three first cases were all berthed forward. The storeroom, from which many dead rats had been thrown out, was situated amidships in the lower 'tween deck of No. 4 hold and was not rat-proofed against the hold space. The fourth case was berthed in the port alleyway and the door to the stairway of the infected storeroom opened into the alleyway opposite his cabin. The third case—that of the lavatory attendant, may need a little straining of the imagination, but not so to anyone who knows the intimate association between a rat community and their nearest source of water supply. The lavatory was situated in the port alleyway, a few doors up from the opening to the storeroom, in which fact lay the danger which beset the lavatory attendant. The incidence of the disease in the ship's complement no less than the history of the dead rats found—eighty dead were thrown out—indicated the storeroom as the source of danger. The storeroom cat took the disease but recovered after the suppuration in the cervical region; its illness coincided in point of time with that of the storekeeper whose pet it was.

Considering that out of a complement of 469 souls, these four men were selected by the disease we may conclude that the ship is an illustration of the fact that habitually to enter the storeroom or to spend a large portion of the watch, whether on duty or on the watch below, in its proximity, determines the incidence. Every hold contained rats which had died of plague, but the storeroom was the focus of human infection.

S.S. Hector was provided with temporary poop quarters containing an improvised food store, a gunner, a signalman and a lamp trimmer. They became infected in succession. The men complained of smells and the food store adjacent to their quarters was cleared of dead rats. The cases on this ship comprised these three men first, then the storekeeper and his assistant, who were berthed amidships well away from the store. But for the provisional living quarters erected in the poop the storekeepers would have probably afforded the first and only cases. The complement was fifty-nine all told, and was lodged—the crew in forecables and officers amidships.

S.S. Nagoya had seven cases, all in her port forecable—the native food stores opened by a trap into this port forecable—the storekeeper and his assistant were the first cases and the position of the food store very evidently determined the incidence of this outbreak. The firemen in the starboard forecable were not infected, nor any others of a complement of 413.

S.S. Alps Maru had arrived in dock before the outbreak. The cook was the selected victim; but it transpired that he had only been cook one day before his illness began and two days before diagnosis; he had previously been and still practically was the food storekeeper. I saw on this ship a rat lying in the officers' bath-room, where it had died, this observation recalling the case of the lavatory attendant on the *Somali*, and emphasizing the necessity of water to the rat and the danger of the neighbourhood of a water supply in case of rat infections on board.

In other ships the human incidence of the disease was greatest in the neighbourhood of the food store; but other considerations entered into the outbreak.

I am unable to put before you a list of dates which show the time which

elapsed between presumed infection of the ship and the onset of the first human case because of the difficulty of determining the place of infection. Some facts however emerge from a consideration of dates.

S.S. *Sardinia* left Bombay on March 23; the first case occurred on April 27, thirty-five days later and only seven days before the ship entered the Port of London. The ship stayed at Marseilles from April 13 to April 16 for discharge of cargo. Cargo was discharged at Gibraltar on April 22 also. At Marseilles, as is customary when 500 tons or more of cargo is to be landed from a ship coming from an infected port, a fumigation was carried out while the cargo was in the holds. Dead rats were thrown out of the food store, which was situated in front of the collision bulkhead, soon after the ship left Marseilles; the Marseilles fumigation could not be accountable for the death of these rats except in the secondary way of having either chased them there to die, or having chased infected rats amongst a non-infected rat community in the storeroom.

I infer that the Marseilles fumigation was the disturbing factor in this ship, where a rat infection had been simmering in the hold and was brought out into the open by the fumigation. A human case occurring eleven days later, infection must have followed closely on this interference with the comfort of the rat community in the holds. It must be noted however that the hatches had been opened and cargo discharged, so that the disturbance of the rats may not have been due solely to the fumigation. This ship has features common to many, which explain the path of infection and the danger of ill-considered attempts at disinfestations. The watertight (collision) bulkhead absolutely shuts off the fore peak from the hold. But the chain-locker is not so shut off; it lies behind the bulkhead, it drains into the bilges, it opens by a hatch into lower fore-castle quarters, and any fumigation in the hold would presumably drive rats into the chain-locker and up the chain and chain pipes or up the hatch. Two cases occurred in the lower fore-castle quarters, into which the chain-locker hatch opened, one in the port fore-castle, three in the starboard fore-castle, and one, a storekeeper, lived opposite the port fore-castle door.

On S.S. *Matiana* it was a month after leaving Bombay and a week after leaving Delagoa Bay that the first human case occurred. At Delagoa Bay a fumigation of the fore holds had been attempted in the presence of cargo, and the suspicion is again aroused that eviction of infected rats rather than disinfestation of the hold resulted. The arrangement of the chain-locker approach on S.S. *Matiana* was such that the starboard fore-castle would receive infected rats by way of a hatch from the chain-locker opening into the fore-castle floor from just behind the collision bulkhead.

S.S. *Nagoya* has a rat history which shows that from London to Yokohama and back again a rat infection existed on board. She had a complement of over 400 persons and no case of plague was found on board between the middle of June and October 25. A solitary case of "influenza" excited suspicion, especially as this was solitary and ended in death. The case was seen by many doctors and the diagnosis remained undisturbed from August 14 when death occurred, to October 25. On this date several more cases of similar diagnosis were found to be plague. On October 15 the ship had been fumigated at Marseilles as is customary in circumstances already alluded to; on October 21, six days later, the first case of plague occurred in the fore-castle. Three dead rats brought from the food store in the fore peak were seen by me. The pupæ of flies on these showed them to have been dead—presumably from

plague—from a time which antedates the Marseilles fumigation; yet the Marseilles fumigation may have concentrated the infection in the fore peak and precipitated or intensified the attack.

A weak fumigation by sulphur dioxide is one of the greatest disturbances to which hold rats can be subjected. The vapour pours down any broad channels to the bottom of the hold by mass displacement of air and if sufficient time and concentration of the gas be used, it is lethal to rats. But on S.S. *Nagoya* passengers were located in the upper "tween decks," i.e., in the holds, and they returned to their quarters very quickly after the fumigation, thus showing how feeble was the strength or quantity of sulphur dioxide admixture poured in. No doubt it was stronger for a time in the lower parts of the hold—sufficiently strong to kill some rats perhaps, and to drive out the remainder. The purpose of the French authorities may thereby be served; but the comparison of the three vessels, *Sardinia*, *Matiana* and *Nagoya* shows I think that such a measure as incomplete fumigation of holds in the presence of a suspected rat infection is liable to precipitate the human infection which, given time, might or might not otherwise occur.

Another disturbance to which the rats will certainly be subjected is due to the discharge of cargo. It must be the history of many a vessel that the rat infection or rat mortality does not show during the voyage but is found in the hold on discharge of cargo at the port of arrival. Similarly rat infection must exist on occasion without being found. I hold this belated discovery and want of discovery to be the reason for repeated small rat mortalities which may occur ashore in any port trading with endemic centres of plague. Although the human element is too serious to be welcomed as an index of danger, it must be recognized that the declaration of human cases has been a safeguard to the port of London in at least seven of the ships here dealt with. The disturbance of infected rats by cargo discharge is dangerous to the ship's complement first, then to the inhabitants of the port of discharge.

In the cases of S.S. *Clan Lamont* and S.S. *Alps Maru*, the ships had actually arrived before the human case of plague occurred. Now allow for a little extension of the time before the human case develops and the ship may have sailed to another port before discovery, and thus give the port of discharge undeserved disrepute. The case of the *Nagoya* shows how the infection in its living carriers may hang on in the obscurity of the hold for months.

Delayed human outbreaks which occur in consequence of discharge of cargo may account for many otherwise obscure cases. I do not know the circumstances sufficiently fully to detail them, but I have in mind a ship that sailed to Canada and discharged her cargo there; she discharged her case of human plague at Bristol; also the ship that discharged her Bombay cargo at Wellington and brought her case of plague back to the Indian neighbourhood from which the infection probably originated. A voyage is usually reckoned from the port of homeward lading for sanitary purposes, but it is evident from the case of the *Nagoya* that in investigating the history of plague on any ship the outward voyage, or even the previous voyage, may have to be taken into account. The point is, that disturbance of the hold is often the beginning of the transfer of rat infection to man and even on such disturbance the transfer may be long delayed.

I have tried to elucidate the question as to the number of rats on a ship which may give rise to an outbreak of plague; as with bacilli in milk and in sewage-contaminated water, number is of small importance as compared with quality.

Willoughby: *Plague on Shipboard*

Name of vessel	On voyage		At Gravesend	
	Trapped	Found dead	On discharge	On fumigation
<i>Sardinia</i> ...	—	Seen ?	—	41
<i>Matiana</i> ...	42	12	77	15
<i>Somali</i> ...	27	80	103	69
<i>Hector</i> ...	—	12	16	—
<i>Japan</i> ...	—	Seen	16	31
<i>Clan Lamont</i> ...	66	Seen	—	19
<i>Nagoya</i> ...	—	975	—	—
<i>Alps Maru</i> ...	—	Many seen	57	—

In the list I present some numbers with regard to rats on infected ships which indicate that human outbreaks occur where comparatively few rats are concerned. This is especially remarkable in the instance of the ship *Hector*, where the rat history only includes twenty-eight rats. The conditions on this ship, however, were such that on examination of the manifest it was at once surmised there were but few rats on board: the cargo was almost completely "non-ratty," foodstuffs for rats were absent. The "tween decks" of No. 4 hold contained a vegetable locker reached by means of the hatchway, at which point the hold rats were actually fed and petted by the crew. The rats were forced by circumstances either to come on deck to obtain solid nutriment at the galley or foodstore, or to take up their quarters permanently above the main deck. I was unable to obtain the number of rats found dead in the holds on fumigation but the number of dead found on discharge of cargo was only 16. This may be contrasted with the *Somali* and the *Alps Maru*, on which 103 and 57 respectively were found dead during discharge of cargo. The *Alps Maru* was not completely discharged at this port and no search was made; the number 57 would be presumably increased had the scrutiny been thorough.

It should be understood that the policy pursued in the case of each ship was to pass the cargo overside into barges, under conditions which it was hoped and, I think, proven, would make the transfer of rats from ship to shore unlikely, if not impossible, and to disinfect the ship only when the holds were empty. On a plague-infected ship rats found dead during discharge can be presumed to have died of plague, their condition as to putrefaction would show to some extent whether there was recent infection and their situation and numbers the extent of the infection.

The full observation of the rat conditions was found impossible under the conditions of hurry inseparable from shipping during and immediately after the war; column four could not be fully completed, where the numbers are given the tale is probably underestimated. For instance, on two ships, in fumigating the holds, certain cabins situated on the main deck could be filled with fumes from the hold; indeed it was unnecessary to place pots of sulphur in them. They were cabins, similarly situated on both ships, opposite the food store entrance in the port alleyways. On one of these ships rats—dead rats—gave evidence of their presence in and caused complaint from the occupants of the cabin after fumigation. However, the rats were dead, and I confess to little concern about the nuisance under the circumstances. It was rather of the greatest interest that a main deck could give exit to rats from a hold through its substance, and that exits should show themselves in being and in use in the neighbourhood of a food store and not elsewhere. Neither plating nor wood deck remain rat-proof at the ship's side; when the plating works away or where there is no tight fit about the angles, the wood will eventually be pierced if the elaboration of a run be convenient to the rat.

It is not a difficult matter to get evidence as to a rat mortality on an infected ship at the time of entry into port by questioning the persons likely to know, and the proper persons at present are those who are brought into contact with the rat. The rat history was quite clear to those in authority on the ships *Matiana*, *Somali*, *Hector* and *Alps Maru* after the human event. On S.S. *Nagoya* the natives who suffered from plague knew what the malady was, but those in authority apparently did not know—a rat mortality was in good faith denied as regards the storeroom, though not for the rest of the ship; but the issuer of stores was dead, and I think he must have known of the rat mortality in his little domain.

The recent Orders of the Ministry of Health place a duty on the Master or Officer in Charge of a ship of notifying a rat mortality on board whenever found. I hope that in time the importance of the matter will be fully realized by shipmasters, and that they will inform themselves from time to time of the state of their ship (and especially of their store-room) as to rat mortality, when trading with infected ports. A favourable opportunity for finding indication in the holds exists during discharge of cargo.

On two of the ships infection of one of the crew on board has followed the arrival of the vessels in port. These represent failures of the measures taken. In one case a limited rat infection of a dock followed: this also represents a failure. As time has gone on the following measures have commended themselves as a complete programme of precautions:—

(1) The vessel is moored in the stream pending complete discharge of cargo and complete fumigation.

(2) The passengers are discharged under "surveillance."

(3) The crew is reduced to a skeleton minimum, and is placed under "surveillance" or "observation."

(4) The infected quarters, living quarters of the crew and food stores, with all their contents, are subjected to an immediate six hours' fumigation, under a 2.3 per cent. atmosphere of sulphur dioxide (2 lb. sulphur burned to 1,000 cubic ft.).

(5) The crew standing by the ship is berthed as far as possible from foci of infection (food stores), and the quarters subjected to refumigation at least once a week pending the final fumigation.

Vaccination is urged on the crew.

(6) The cargo is discharged under precautions against transfer of rats. Every package is examined from this point of view. Barges are only allowed alongside during daylight hours.

(7) The workers wear one-piece overalls tied in at the sleeves and ankles against the attacks of fleas, and are under "surveillance."

(8) When empty of cargo the whole of the closed spaces on the ship are placed simultaneously under sulphur dioxide: 2 lb. of sulphur burned to the 1,000 cubic ft. is more than ample for the purpose in view if the spaces are properly sealed. If six hours can be obtained for the disinfection usually twelve or more can; the longer the process the more certain the effects as regards fleas and bacteria.

(9) A deck rat hunt is instituted while fumigation is in progress.

You will notice the absence of mention of vaccination of the cargo workers and of the removal of the patients with their effects and bedding. With regard to the latter point no bedding or clothing should go ashore with the patient, not even his own shirt and blanket, these should be left on board until

after the preliminary fumigation, as a measure of protection to the matron and nurses of the hospital and the disinfecter operator. From experience, I look upon this precaution of the immediate preliminary fumigation of infected quarters and their flea-infected contents as being of the utmost importance to the crew on the one hand and to the hospital and disinfecting staff on the other. It is the attention to detail in the measures suggested which confers success on the long and expensive operation of dealing with a plague-infected ship. Unless this attention can be assured, the operation might as well be shortened by the application of the Clayton apparatus to a full hold, with the attendant disadvantages of insecurity in the result and probable damage to cargo by reason of the long period and large amount of gas which must be used to secure any effective penetration.

A 75 percentage of efficiency in rat destruction even on a non-infected ship should not be enough to procure a certificate stating any satisfaction in the method or course pursued, and on an infected ship it simply constitutes inefficiency. It is obvious that where rat infection is presumed, no disturbance of the hold should be undertaken without simultaneous fumigation of the crew's quarters.

In conclusion, of the cases admitted to Denton Hospital, I would mention two that seem to be of epidemiological interest. One boy was admitted with septicæmia: for three days he was in intense distress by reason of a pleurisy involving almost the whole of the membrane indicated; a left femoral bubo then appeared, and he recovered without development of pulmonary signs. The other case was mildly septicæmic without further symptom for seven days: he then developed a cough with blood-stained sputum and pleurisy; the sputa were loaded with plague bacilli; at the time of his death, twenty-four hours later, a condition of massive cervical oedema had been established. I suppose such a type of case to be the connecting link between the bubonic and the pneumonic epidemics, should conditions of overcrowding or other close contact permit of droplet infection so as to continue the pneumonic type.

DISCUSSION.

Dr. W. D. BETENSON said he had been interested in the history of the cats on these ships. He said that Jehangir, the Mogul Emperor of Delhi, 1605-27, in his famous memoirs, had written of the plague at Agra in 1619: "The daughter of Asaf Khan the elder, tells me and insists upon its truth, that one day in the courtyard of her house a rat was observed, rising and falling in a distracted state. It was running about after the manner of drunkards, not knowing where to go. She said to one of her girls, 'Take it by the tail and throw it to the cat.' And the cat was delighted. It seized it but instantly dropped it. Then the cat became ill but recovered. The girl, however, died next day. Seven or eight people died also and so many were ill that they went into the garden from the lodging. In brief, in the space of nine days, seventeen people became travellers on the road of annihilation." A contemporaneous writer added: "If the people of that house had left it altogether and gone into the country they would have been saved, but owing to that step not being taken the whole town was destroyed." With regard to the question of spread of plague by the cat Dr. Betenson narrated the following facts: The storekeeper of the S.S. *Somali* had two cats, one of which had swellings under the jaw about May 5, 1918. It was missing for three days and then returned, the swellings having broken and matter exuding. The storekeeper was laid up with plague two days later. This cat was killed May 30 and was then fat and in good condition, the gland under the right jaw was inflamed, otherwise the animal appeared to be healthy. The gland, spleen, heart and lungs were sent for bacteriological examination. The second cat was at this time missing but was found and killed on

May 31. The bacteriological report was: "In specimens from both cats plague-like organisms were found in smears, particularly numerous in the smears from the lungs. But no plague bacilli could be obtained either by culture or by animal inoculation. The diagnosis is therefore negative as to plague." On the S.S. *Japan* complaint was made by the passengers of a cat having lumps around the neck and not being well. The cat disappeared but a few days later it returned and further complaint was made about the fur around the neck being in a "messy" condition. It was not proved that this cat had suffered from plague either. Dr. Betenson said that cats and dogs were attacked by plague but usually recovered and it was a question whether this partial immunity did not defeat the bacteriologist. As to the question of the relationship between pneumonic and bubonic plague, judging from his experience in India and Johannesburg, the epidemic outbreak began with pneumonic, and continued with bubonic cases.

Rear-Admiral Sir PERCY BASSETT-SMITH said that as he had been for the first two years of the plague epidemic, stationed at Bombay in one of H.M. ships, and acting as Senior Medical Officer, the prevention of the introduction into the Fleet had been of the most extreme importance, particularly as the crews consisted of numbers of Lascars and Goanese, besides the Europeans. Having first ascertained that the rats, which were in great abundance in the ship, were free from plague, he had considered it of first importance to minimize, as far as possible, the danger of the men contracting it on shore and bringing it on board. Consequently all-night leave had been stopped and careful inspections of the crews had been frequently made. During this period of two years there had been only two cases and in both of these infection had been contracted when the men were on shore and did not return to the ship. On removal of the parent ship to the docks for annual repair, great anxiety had been caused as the grain stores in the docks, at first, had contained thousands of rats, numbers of these dying daily. The ordinary rat-stopping devices had been placed on the cables and hawsers and appeared to be effective. He was rather surprised, that in the cases quoted by Dr. Willoughby, submaxillary buboes had been present yet the cases had been mild and had recovered. At Bombay, submaxillary and cervical buboes had been generally looked upon as most fatal signs. It would appear that the virulence of the infection found in the English cases had been less intense. The prevention of introduction into the ship was far more important to them than the treatment and disposal of cases afterwards. It might be of interest to mention that in North China the figure of a cat, red on black ground, was used as a charm against plague by the inhabitants.

Mr. GLANVILL CORNEY observed that mention had been made of cervical and submaxillary bubo occurring, with general signs of malaise, in cats, on board ships where there were plague-infected rats; but that no plague bacilli had been revealed, after slaughter, in the bodies of the cats in question. In a colonial port where the presence of plague-infected rats was being strictly watched for (but where no human cases had ever occurred) several cases of submaxillary adenitis in cats, usually running on to suppuration, if not quickly relieved, had come under his notice. These had invariably been found to be due to the impaction of one or more bearded grass seeds in the cat's buccal mucous membrane. On the removal of the offending seed by means of forceps the cats had always recovered quickly. No evidence of plague infection had ever been found in them. Last summer an exactly similar case had been met with near Maidstone. Grass seeds would not be likely to find their way into a ship's holds; but other irritating objects picked up by a cat's fur could easily pass into the mouth, on the animal licking itself clean, and set up similar trouble.

Mr. A. W. BACOT remarked on the perfunctory manner in which the quarantine regulations appeared to be applied in some British ports abroad. At a West African port he had seen them utilized in what seemed to be a disciplinary rather than an hygienic spirit. A mail boat which had visited Daccar during an outbreak of plague proceeded to moor at the usual anchorage some 300 to 400 yards from the shore instead of at the quarantine station much farther out. When signalled to comply with the regulations she lifted her anchor and again dropped it within about 100 yards, and

shore parties were at once allowed to board her while lighters went alongside for the discharge of baggage, &c. It seemed a pity to trouble the officers of the steamer at all unless the regulations were to be rigidly enforced and in that case the regulations ought to be frequently modified to bring them into line with the most recent knowledge of the different ship-borne diseases.

Lieutenant-Colonel WILKINSON asked Dr. Willoughby what method he found most satisfactory for the fumigation of ships. He understood that a Clayton apparatus had formerly been used in the Port of London, and in view of the increased attention now given to the fumigation of vessels both in this country and abroad, it would be a great advantage to have an opinion based upon so large an experience as that of Dr. Willoughby as to the advantage or otherwise of this apparatus as compared, for example, with the burning of sulphur in pots.

Dr. WILLOUGHBY replied as to the method of fumigation of ships. Any lethal gas which did not announce its presence immediately was not worth practical consideration. Hydrocyanic gas was excellently lethal but sulphur dioxide was at present the only fumigant fulfilling all the desiderata. It was a matter of little importance how the sulphur dioxide atmosphere was obtained, whether from burning candles, by mechanical distribution, or from the pure sulphur dioxide in tins. In empty ships, properly sealed as regards each space under fumigation, distribution was assured by the rapidity and completeness of diffusion. Diffusion was theoretically somewhat delayed in the expansion of pure sulphur dioxide from tins, the atmosphere formed being heavy and cold. Tins were useful in fumigations on oil tank steamers. The Clayton apparatus was a good one for rapid distribution of a lethal atmosphere, especially the machine designed to throw a 15 per cent. gas. The 3 per cent. machine was not fool proof because of the ease with which its limitations, heat production and sublimation, were reached, with a resultant tendency to the working of the machine at a low percentage. The constant and skilled attention necessary was difficult to secure. So small a percentage of sulphur dioxide however was necessary to the killing of rats that the 3 per cent. machine, though not worked to its limit, was perfectly effective. Attention should be rather paid to the effective sealing of the quarters or holds than to the simple question of the percentage atmosphere: 0.5 per cent. atmosphere maintained over four to six hours easily killed a rat. One lb. of sulphur in burning produced a 1.18 per cent. atmosphere in 1,000 cubic ft. Therefore 1 lb. of sulphur to 1,000 cubic ft. was lethal and absolute if sealing were effective; 2 lb. per 1,000 cubic ft. was over-caution but allowed for human error; 3 lb. was waste of material for efficiency, and efficiency of course implied supervision. Rat destruction was most easily accomplished by the burning of sulphur in prepared 1 lb. candles. The candles were disposed in suitable numbers in each space to be fumigated, lit and the spaces sealed. Nothing further need be done; the fumigation "did" itself. Where, for the process, six hours sealing could be obtained on a ship twelve to twenty-four could usually be secured. At the end of twelve hours the hold would still be unapproachable by human beings until means for clearing the gas were used. The methods in use in the Port of London were the Clayton 3 per cent. apparatus and the candle process; they were equally effective and absolute for rat destruction. Dr. Willoughby was of opinion that the simple process was made unnecessarily mysterious, and that it should be a domestic matter for the shipping companies to carry into execution the directions of the Sanitary Authority, while orders, advice and the effective supervision of that execution were the Port Sanitary Authority's true functions in mere rat destruction on ships. Where plague was suspected or proven this supervision would still be the only skilled portion of the work of rat destruction. Every hole and cranny on the ships deck, even the hollow winch barrels, should be subjected to systematic search while the closed quarters and holds were under simultaneous fumigation.

Section of Epidemiology and State Medicine.

President—Dr. A. K. CHALMERS.

The Epidemiology of Measles in a Rural and Residential Area.¹

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SINCE February, 1902; measles has been compulsorily notifiable in the landward portion of Renfrewshire. This area is administered by one Medical Officer of Health, working in two Districts, First and Second. The First District is largely suburban, residential and industrial, with rapidly increasing population, while the Second District is mainly rural and the population has increased slowly. The circumstances have therefore been fairly suitable for studying, not only the influence of notification and administrative measures on measles under different conditions of environment, but also any features of the epidemiology of measles which may be peculiar to populations of low density. The period of twenty years, 1893 to 1912, has been selected for this purpose, and the writer is indebted to Dr. A. Campbell Munro, Consulting County Medical Officer, for access to the records of these years and for guidance in their compilation.

It may be said at the outset that measles has been seriously regarded in Renfrewshire. Notification has not been an end in itself, but only the beginning of concerted preventive measures and propaganda aiming at control of the disease. The writer is satisfied, from an intimate knowledge of the administration in Renfrewshire, that every practicable means of controlling measles recognized during the period under review was applied wholeheartedly.

In a previous paper [1] an effort has been made, with limited success, to demonstrate the effect of notification in Renfrewshire, by comparing the deaths from measles there and in adjoining administrative areas. So far as they went, the figures quoted indicated that notification was an advantage; but the absence of the data which notification affords is an obstacle to any accurate comparison of the behaviour of measles in an area where it is not in force with one in which it is.

In the course of the present inquiry any internal evidence for or against the value of notification has been sought. The main purpose, however, is to put on record the observed facts of the incidence and fatality of measles in an area of this character. No detailed information from a County area appears to be available in medical or epidemiological literature and the importance of obtaining it justifies notification, from the scientific point of view, even if no other benefit can be proved.²

¹ At a meeting of the Section, held February 25, 1921.

² Some of the principal facts in the experience of Renfrewshire—(a) monthly distribution of cases in District I and the same in District II; (b) case incidence and fatality at several ages in the combined Districts—were given in full detail in tables which are not here reproduced.

PERIODICITY.

If the monthly incidence of measles in Renfrewshire is traced throughout the years since 1891, the long and short waves, now recognized as a characteristic feature of the disease, are clearly seen. The long wave seems to have a period of about twenty years, although the duration of the observations is not sufficient to make this certain. The biennial period is very pronounced at the summit of the long wave but tends to be lost in its trough. The usual spring-summer incidence occurs. The form of the waves fits fairly well Brownlee's theory of recurrent vitality of the virus at intervals of nearly, but not quite, two years [2].

The practical point, however, is that there is fair correspondence between the behaviour of measles in the two Districts and in the adjacent city of Glasgow. There is therefore fair ground for assuming that a common strain or strains of measles virus inhabit these areas and that further comparison of the statistics of measles between them is permissible.

DEATH-RATES.

In Table I, the mean death-rates from measles in certain periods of ten years are shown. The mean death-rate from measles in Renfrewshire has not been high in any of these periods and it is also apparent that notification was not followed immediately by any decline. But the marked fall in both Districts during the last ten years is striking, in view of the fact that several years of this period were included in the summit of a long wave when a high death-rate might have been expected. It remains to be seen whether this decline is attributable to change of incidence or of fatality.

TABLE I.

Mean Annual Death-rates from Measles per 1,000 of the Population in certain Decennia.

		District I		District II		County
1881-1890	...	0.26	...	0.20	...	0.24
1893-1902	...	0.27	...	0.21	...	0.25
1903-1912	...	0.19	...	0.10	...	0.16

CASE-INCIDENCE.

The mean case-rates in two periods of ten years during which notification was in vogue are shown in Table II. The case-rate has declined in both Districts, but to a much less extent than the death-rate has fallen. The latter decline is therefore not explained by the former. The fact, however, that the case-rate has fallen at all is significant in view of the fact, already mentioned, that the second period was exceptionally favourable to high incidence. It would seem to be fair to give at least some of the credit to notification and preventive measures.

TABLE II.

Mean Annual Incidence of Measles per 1,000 of the Population.

		District I		District II		County
1893-1902	...	22.13	...	18.68	...	20.73
1903-1912	...	20.24	...	17.04	...	19.21
1893-1912	...	20.99	...	17.83	...	19.87

FATALITY.

For the same periods of years the mean case-mortalities are shown in Table III. A marked decline in fatality has occurred which appears to be of real significance so far as errors of chance are concerned and which accounts for the difference between the fall of the death-rate and of the case-rate.

There may have been some failure of notification in the earlier years which would have the effect of exaggerating the difference of fatality and of diminishing the difference in the case-rates. In the opinion of the writer, this fallacy is not great in the Renfrewshire figures and the main feature of the period of notification, preventive measures and propaganda has been great diminution of the fatality of measles.

TABLE III.
Mean Fatality per 100 Cases.

		District I		District II		County
1893-1902	...	1.23	...	1.14	...	1.20
1903-1912	...	0.92	...	0.60	...	0.83
1893-1912	...	1.05	...	0.88	...	0.99
$\epsilon_{1,2}$ *	...	0.16	...	0.21	...	0.12

It will be observed that the fatality of measles is lower in the rural Second District than in the First District, which is more densely populated. The comparison may be carried beyond the County as in Table IV.

TABLE IV.
Fatality per 100 Cases of Measles in Several Districts.

Urban District, 1892-1894 [3]	...	...	...	...	...	6.1
Glasgow, 1908 [4]	...	...	...	...	...	5.1
Edinburgh, 1880-1901	...	...	...	...	...	3.5
Aberdeen, 1883-1902 [5]	...	...	...	...	...	3.3
American States, 1914 [6]	...	...	...	...	...	1.7
Willesden [7]	...	...	...	...	...	1.3
Renfrewshire, 1893-1912	...	...	...	...	...	1.0

Roughly, the fatality falls as the density of population diminishes. Many factors have to be considered such as age-distribution of the population, social status, higher resistance of the rural child to disease, immunity from complications and varying efficiency of administration, and some of these will be dealt with later. But some other explanation seems to be required to account for the variation of fatality, not only between town and county, but also of excessive fatality in isolated epidemics occurring in institutions, in armies and in "unsalted" populations, many of which are recorded in literature.

As illustration, reference may be made to the behaviour of measles among the soldiers of the Highland Division at Bedford in 1914-15, a chart of which has been kindly lent to the writer by Colonel Dewar. There is no evidence that measles was more than usually fatal to the civilian population at that time but its fatality among these susceptible Highland soldiers was 12.4 per cent. The first cases were infected from civilians and the fatality in October (eight cases) and November (seventy-nine cases) was *nil* and 2.53 per cent. respectively. Later, however, when other soldiers were infected from these men the fatality rose to 13.82 per cent. in December and 15.62 per cent. in January. It is not sufficient to say that the "unsalted" character of this Highland population was the cause of the excessive fatality; that is not the experience among similar immigrants in Glasgow infected at random from the general population. Unhygienic conditions for the patients probably did exist but not more so in the later than in the early stages.

It is suggested that the explanation tentatively given by Whitelegge [8] is the correct one, viz., that the virus of measles is intensified under circumstances which favour rapid transmission from person to person in a highly

* $\epsilon_{1,2}$ is the standard error, measuring the significance of the difference between rates in the first line (1) and the second line (2) of the table.

susceptible population. As the opportunity for rapid transmission is clearly greater in cities and towns than in rural districts, the difference of fatality in such areas may also be due to this cause.

INCIDENCE AND FATALITY ACCORDING TO AGE.

It has been shown that the fatality of measles, irrespective of age, has been higher in certain urban areas than in the County of Renfrew. This might be due partly to a difference in age-incidence. There is a contrast between incidence in town and county. In the county the age of attack is delayed. The proportion of all cases of measles which occurred at ages under 3 years (the most fatal) was 24·75 per cent. in Renfrewshire, 33·32 per cent. in Aberdeen and 34·50 per cent. in Glasgow. This, however, explains only partly the difference in fatality already discussed.

In Renfrewshire, as in Aberdeen, there was a sudden excess of incidence in the sixth and seventh years of life—i.e., at the age of entering school. This indicates the effect of schools in exposing susceptible children to measles and justifies the attention given to this mode of transmission in Renfrewshire, where closure of infant classes has been regularly applied whenever departmental inquiries have shown that such classes were likely to have been infected.

If such methods were successful they should in course of time delay the age-incidence of measles. The result was tested in the two areas of Renfrewshire, and it was found that the more rural district had a lower incidence at all ages under 10 years, but higher above that age. In this district, too, there had been a decline in the case-rate at each age under 10 in the second decennium and a slight transference to the age period 10-15. In the First District, however, exactly the opposite movement had occurred, the younger children being more heavily attacked. The contrast may be expressed briefly in terms of the mean age of all cases under 20 years of age. In the First District the mean age fell from 5·35 years in 1893-1902 to 5·16 years in 1903-12; while the corresponding figures for the Second District were 5·94 and 6·09. The conclusion may be drawn, therefore, that in this important respect the efforts of the Health Department have failed in the First District but have had some success in the Second. The further inference can be drawn that the greatly reduced fatality in Renfrewshire has not been mainly due to more favourable age-incidence of the disease in the second ten years.

The fatality of measles at various ages of life in different places may be studied from the figures of Renfrewshire, Aberdeen, Glasgow and Willesden (Table V). The general trend of the figures is similar in the four places, but at each age fatality in the county is much lower than in the large cities, and is approached only by that in Willesden. It is evident that whatever influences in the less densely populated areas conduce to low fatality are exerted equally at each age of life, and the comparatively low mortality in Renfrewshire is not entirely, or even mainly, explained by favourable age distribution of the cases.

TABLE V.
Fatality per 100 Cases at Several Ages.

Age	Renfrewshire	Aberdeen	Glasgow	Willesden
—1	4·3	13·9	16·2	2·8
—2	4·6	10·0	18·5	5·0
—3	1·4	3·4	5·3	3·0
—4	0·5	1·6	2·5	1·5
—5	0·2	0·9	1·3	0·2
5 and over	0·2	0·5	0·7	0·3

INFLUENCE OF SOCIAL CONDITION.

For want of a better measure of social condition the size of house occupied has been adopted as in other similar inquiries ([4] and [5]). So far as incidence of the disease is concerned, the population in small houses is most heavily attacked. For instance, for the years 1910, 1911 and 1912 the rates per 1,000 of the population were 28 in one-apartment houses, 36 in two-apartment, 19 in three-apartment, and 13 in houses over this size. The records of Glasgow, which are similar, show that the difference is not entirely due to the larger population at susceptible ages in small houses, but similar census information is not available to confirm this in Renfrewshire.

Fatality is also connected with size of house in Renfrewshire, falling from 1'85 per cent. in one-apartment, 1'24 per cent. in two-apartment, 0'69 per cent. in three-apartment, to 0'31 per cent. in larger houses (*cf.* Glasgow and Aberdeen). In Scotland, however, the occupants of one- and of two-apartment houses belong practically to the same social grade, and it is probable that the heavier mortality in one-apartment houses is mainly due to the larger proportion of young children among the occupants. This view is strengthened by examination of the fatality-rates among children in Renfrewshire under 3 years of age, which are 3'7 per cent. in one-apartment, 3'7 per cent. in two-apartment, 2'5 per cent. in three-apartment, and 1'1 per cent. in larger houses. The general rule, however, holds good, even at these ages, that fatality diminishes as social station improves. Renfrewshire's low fatality as compared with Aberdeen and Glasgow is repeated in each size of house, and is therefore not due to better social conditions of the patients, just as it has been shown not to depend on favourable age-distribution.

THE ADMINISTRATIVE CONTROL OF MEASLES.

Any measures for this purpose must have regard to the channels of infection. Children are infected in their homes or at school or at random. The fact is that most children of school age, especially in rural districts, are infected at school, and it is through the school that any measures to control measles have usually been applied.

The effect in Renfrewshire of domiciliary and of extra-domiciliary infection on the age-distribution of cases goes to show that whereas only 34'6 per cent. of the primary cases are under 5 years of age, 65'9 per cent. of the secondary cases occur at these ages—i.e., before entering school, and the sudden aggravation of incidence among primary cases in the sixth and seventh years is further evidence of the influence of schools.

This influence is also illustrated by Charts I and II, which show for two typical districts the course of a measles epidemic as it involves the school population and the children under school age. Chart I shows the course of an epidemic as it affected primary cases among school children, other primary cases and secondary cases in a relatively isolated village. In the first three weeks most of the cases were primary cases of school age, while secondary cases formed the bulk of those sickening in the last four weeks. Primary cases under school age formed a small proportion at any time. The epidemic burned itself out in eight weeks. Only half the cases were infected outside of their homes, and less than one-third of these were under school age. This form of epidemic is characteristic of the incidence of measles in isolated villages.

In the other epidemic (Chart II) a populous area on the outskirts of Glas-

gow was involved. Sporadic cases were occurring until the infant class of a school was infected on March 4, an outburst of school primary cases following a fortnight later. In another fortnight a crop of secondary cases occurred, and, coincidentally, the incidence of primary cases under school age increased. The fall of school primary cases was delayed by infection of a second school and the curve of secondary cases followed more or less the same course; but the primary cases under school age continued to occur in increasing numbers, and formed the bulk of the latter half of the epidemic. More than two-thirds of the cases were primary, and two-thirds of these were under school age. This chart is typical of the course of measles in populous places.

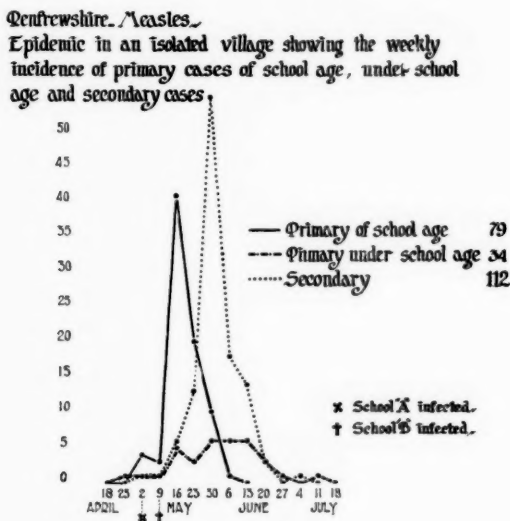


CHART I.

Clearly, it would be difficult to control an epidemic of the latter type by efforts directed at the school. Random infection plays too large a part. On the other hand, the epidemic traced in Chart I indicates that control through schools may be possible. Dr. Campbell Munro [9] and others have cited many instances in which they were satisfied that school closure had been effective in practice, and the statistics as to mean age, &c., quoted above, suggest that such measures have been of value in the Second District of Renfrewshire, where small isolated communities predominate. The results in Renfrewshire, however, which probably represent the best that can be attained by school closure, indicate only partial success. In any case such measures can only indirectly protect the young children who constitute the bulk of the secondary cases, and among whom the fatality is high.

The method suggested by Brownlee [10] of transferring exposed susceptible school children from homes where there are younger susceptible

children, aims at a solution of this problem. It presents serious administrative difficulties, and would probably fail in populous districts, but an area such as the Second District of Renfrewshire would be a suitable field for an experimental trial of the method.

Hospital treatment and home nursing can provide effectively for only a limited proportion of the cases lying ill at any one time during an explosive epidemic. In any case such methods can have little or no effect on the incidence, and it has not been proved that they diminish the fatality to a greater extent than continuous propaganda as practised in Renfrewshire.

Renfrewshire — Measles.

Epidemic in a populous district showing the weekly incidence of primary cases of school age, under school age and secondary cases.

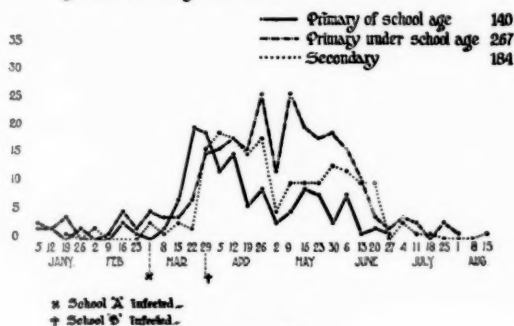


CHART II.

CONCLUSIONS.

(1) Notification of measles has been justified in Renfrewshire, not only by the epidemiological information it has furnished, but also by its effect on mortality from the disease.

(2) It has not materially affected the case-incidence in the more populous districts, but there is evidence that the rural districts have benefited also in this respect.

(3) Apart from any administrative measures, age-incidence, or social conditions, there are factors rendering measles a much less fatal disease in rural than in urban areas.

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DISCUSSION.

Dr. G. S. BUCHANAN said that it was important that the object of the Ministry of Health in withdrawing the General Order relating to the notification of Measles should not be interpreted to mean that in the opinion of the Central Department no value was obtainable from notification. The contrary would be obvious from a study of the circular and memorandum which accompanied the official statement about the withdrawal of the Order. The essential point to remember was that in this disease the principle value of notification lay in the facilities which it could give to a properly organized system of care and nursing for the measles case. Wherever such system existed and would be facilitated by notification, the necessary powers should be obtainable and official sanction could always be obtained. In regard to the adoption of notification in a rural district as a means of combating measles by school closure, he was doubtful whether for this purpose only the notification was desirable. Reference had been made to the outbreak of measles in the Highland Division in Bedford in 1914. He had always regarded this outbreak as a striking but probably only a typical instance of what would happen to an adult community exposed for the first time to measles infection. There might have been some quite exceptional intensification of the type of the infection, but it certainly was not reflected in the civil population at the same time. The figures which had been shown no doubt suggested an intensification of severity as time went on, but caution should be exercised in interpreting them. So far as incidence was concerned, the whole question was governed by the arrival and new infection of drafts of men from the remoter parts of the Highlands who had not previously been exposed to any measles infection. So far as concerned mortality, a number of other questions had to be taken into account besides that of intensification of type, including the conditions under which the cases were treated and the opportunities of cross infection. The Bedford experience indeed suggested that if, by extreme measures of school closure, isolation and otherwise, it was possible to keep school children in a rural district from measles infection, it was still doubtful whether the public health authorities would really be acting in the best interests of these children in future life, and in the best interests of good preventive medicine, by applying such measures. They would be keeping the children from measles at school age only to let them take it at a much more inconvenient time, and possibly in a severer form, in subsequent adult life.

Dr. W. BUTLER said that Dr. Picken's results in the main corresponded with those which he had made some years ago at Willesden on the whole question of measles incidence and had presented to the Section.¹ He differed in some respects from the author in regard to the aim of preventive measures, not considering that measles could, in existing circumstances, be regarded as preventable. The greatest success which their efforts could produce would lie in postponing the incidence to an age-period when measles was less fatal.

Dr. E. W. GOODALL asked whether cases of rubella had been included or not in the measles notifications. In some years rubella was very prevalent, and its inclusion in notification statistics might vitiate conclusions drawn from them in respect of measles. The extremely high fatality in the epidemic amongst the Highland troops at Bedford was most unusual, and required an explanation. He agreed with Dr. Brownlee that the pulmonary complications of measles were not always due to secondary infections. Occasionally cases of measles were met with in which there was clinical evidence of invasion of the lungs at an early stage of the disease, before the rash appeared. He was of the opinion from clinical experience that the virus of measles attacked primarily the respiratory tract and paved the way for the invasion by secondary organisms. But measles rarely proved fatal within a week of the onset. In estimating the length of the illness in fatal cases if it was desired to obtain accuracy, it was not safe, though it might be convenient, to date the beginning of the attack from the appearance of the rash, because the rash not infrequently came out after the fourth day.

¹ *Proceedings*, 1912-13, vi, p. 120-137.

Measles very rarely killed the patient otherwise than through the lungs. Purely toxic measles was, in his experience, rare.

Dr. ROBERT MILNE said that when Dr. Butler had read his paper on measles before the Section of Epidemiology in February, 1913, he (Dr. Milne) had taken exception to the statement made that nothing could be done to prevent measles from spreading over a community except by the exhaustion of the combustible material. Dr. Butler had said that "one condition, and one condition only, places any permanent barrier to its spread, and that is the protection conferred by immunity. The control of measles, so far as one can judge from a broad survey of the facts, is likely to be successfully effected when a vaccine has been discovered. . . . Until this is done, it would seem that measles must play its time honoured rôle and visit in continually recurring epidemics the successive generations of men, who in this natural but sacrificial manner acquire the protective immunity which enables the greater mass of the population to withstand the otherwise ever present presage of a pandemic disease." When he (Dr. Milne) had read a paper before the Section for the Study of Disease in Children,¹ two years previously, he had said that "measles could be controlled and prevented." He had then told how in a community of 1,400 children two years ago, when his method of prevention had not been carried out, there had been altogether ninety cases. Yet he had been able to assure two distinguished medical visitors that under his method, then being carried out carefully, there would not be a fresh case after a fortnight. And it had actually been so. At Woodford Bridge, in a Home with 400 boys, from 4 to 12 years of age, those who had attended four different schools where measles was prevalent, and who had at first had no prophylactic treatment, had been infected. The treatment had then been commenced and not a case had appeared after two weeks, although they had continued to attend school. A girl had been brought (from service) to the Girls' Village Home in an ambulance, suffering from measles. Instructions were given to admit her to the hospital, take her into an empty ward, carefully treat her in the usual manner, and then put her in the ward where there were nineteen children. She had been there all the time. Moreover, at the same time and in the same ward there had been a case of scarlet fever. No cross infection or complication had occurred. This was the invariable experience with these cases when the provisos were carefully carried out. Some hundreds of medical officers and private practitioners had examined his cases in all stages of both scarlet fever and measles. Yet no one had ever found any complication or infection although they had seen cases of both diseases in rooms with over twenty children under 7 years of age. After ten days they attended school with over 700 other children. Dr. Milne concluded by referring to the success of the method which he advocated in France, alluding in particular to the approval which it had received in reports published in 1914 in *La Press Médicale* by Madame Willbouchewitch and others. Reference should also be made to the *Bulletin de l'Académie de Médecine* of June, 1920. He appealed to medical officers of health to test the method further and give their decision, and free their isolation for nobler and better purposes than isolation of measles and scarlet fever.

Dr. CARNWATH gathered that Dr. Picken was disposed to criticize the Ministry of Health for rescinding the Measles Notification Order, but it seemed to him that the figures submitted bore testimony to the wisdom of this decision. It had to be borne in mind that the notification of measles served a very different administrative purpose from, say, the notification of small-pox. Early knowledge of small-pox cases was essential to the effective control of the disease, but the hope of limiting the spread of measles by means of notification was now generally admitted to be futile. What notification could do, however, was to furnish the local authority with knowledge of the cases which required special assistance, in the way of nursing, medical treatment, or feeding, and in that way, if used as the auxiliary of a good medical service, it might contribute to mitigation of severity and reduction of fatality of the disease. He would have liked to have heard more of the administrative action taken by the Renfrew authorities in dealing with cases as they were notified. Was any hospital accommodation

¹ *Proceedings*, 1911, iv (Sect. Study Dis. Child.), pp. 142-154, 173-184.

provided? Had any attempt been made to improve the domiciliary nursing service? He admitted that it would be difficult for a local authority to provide a nursing service that would be equal to every emergency. All that could be done was to have a nucleus which could be extended as the need arose, and in this connexion he thought that more work was required on lines which would enable a local authority to tell when an outbreak was likely to take place. It had been noted in most school outbreaks that danger threatened only when the proportion of susceptible children in the infant departments passed a certain point. He would like to know whether Dr. Picken had made any observations as to the position of this "flash point" in the Renfrew schools.

Dr. PICKEN (in reply) stated that every effort had been made to exclude cases of rubella. The staff of the Public Health Department were familiar with the distinguishing features of these diseases, and the medical officer visited obscure cases himself. Hospital treatment was rarely offered, and the striking fact was that the mortality from measles had declined in so marked a manner without either hospital treatment or home nursing—i.e., mainly by propaganda. As to the outbreak in the Highland Division, he thought that his theory was supported by the fact that the men arrived in batches. The later arrivals were more or less isolated from the civilian population, and were infected directly from other soldiers, by passing through whom it was suggested that the virus had been intensified. His information was that the hygienic and nursing environment of the later cases, among whom the fatality was so high, were not so defective as to explain the exceptional fatality.

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SESSION 1920-21

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Section of Laryngology.

President—Dr. W. JOBSON HORNE.

Case of Leontiasis Ossium.¹

By H. LAMBERT LACK, M.D.

Notes.—Mrs. H. (private patient). Extensive thickening of the bones of the skull and face causing marked deformity. Commenced over twelve years ago. Can anything be done by operation or otherwise to improve the patient's appearance?

DISCUSSION.

Dr. A. J. HUTCHISON said that some years ago he showed a case of similar nature in a boy aged 15, who three years earlier suffered for a short time from nasal obstruction. In July, 1906, the obstruction returned, accompanied by swelling of the face, which increased rapidly. In November, 1906, he presented symmetrical swellings on both sides of the face, with broadened-out alveolar processes, and downward bulging of the right half of the hard palate. The teeth were displaced, and the nose almost completely obstructed. The eye movements were not interfered with: the vision of the right eye was good, but that of the left had always been defective. Microscopically the case appeared to be one of sarcoma, but clinically it was non-malignant. Two years later nothing further had happened.

Dr. W. S. SYME said he had seen leontiasis ossium associated with suppuration of the antrum and asked whether there was evidence of suppuration in this case.

Mr. E. D. D. DAVIS remarked that the late Sir Victor Horsley operated on six cases of hyperostosis cranii, and found the affected bone was vascular and inflammatory—a cancellous type of bone. Sir Victor did not regard it as a new growth. The speaker had shown two or three of his seven or eight cases to the Section; they were hyperostosis of a localized character and he had

¹ At a meeting of the Section, held November 5, 1920.

found nothing to indicate the cause of the trouble. Sepsis could be excluded and the negative Wassermann reaction showed there was no syphilis. He had seen two cases after operations for the removal of the hyperostosed bone, one by Sir Watson Cheyne, and in both large pieces of bone were removed with no real advantage. The hyperostosis usually slowly increased, but in some cases the disease was arrested.

Dr. DONELAN said he saw a case of this nature in Sir William Stokes' practice in Dublin. The man had been a date-carrier; he carried baskets of the fruit on his head, and a thickening of the bone at the site took place—i.e., at the upper part of two parietals and the frontal and ethmoid regions. Death followed after brain symptoms. At the autopsy the mass of light cancellous bone was found to be $1\frac{1}{2}$ in. thick over the vertex. It might have been caused by injury probably followed by some slowly acting sepsis.

Mr. H. D. GILLIES said that the husband of this patient stated that the enlargement definitely commenced after the removal of the teeth. Possibly she had a septic focus in the alveolus of the upper jaw.

The PRESIDENT raised the question whether in all such and similar cases the disease was due to one and the same cause. It would have been interesting to have heard suggestions about the pathogenesis with a view of treatment. He assumed an infection was responsible. Morbid specimens of the condition were very few. The present case reminded him of a specimen in the Museum of St. Thomas's Hospital, which was lent to the Loan Museum of the Sixth International Otological Congress.¹

Multiple Polypi of the Deep Pharynx.

By WILLIAM HILL, M.D.

THE patient, a male, aged 55, complained of having had, for some years, frequent coughing and suffocative attacks; and the feeling during such attacks of a lump in the throat, which moved about but could not be expectorated, because it was apparently moored. There was no dysphagia. There were sessile polypoid lappets seen with the throat mirror in the left pyriform sinus.

On endoscopic examination, a pedunculated polypus was regurgitated from the gullet into the pharynx. Further examination under a general anæsthetic showed that it was attached to the left upper surface of Killian's pharyngeal lip. It was removed through the endoscopic

¹ Descriptive Catalogue of the Sixth International Otological Congress, London, 1899, p. 136, No. 870.

tube, being secured by a snare, and the base cut through with an elongated Struychen's scissors.

The sessile growths were removed by punch forceps.

DISCUSSION.

Dr. HILL added that very few similar cases had been recorded, and polypi in the lowest part of the pharynx were almost invariably multiple. Multiple polypi in the œsophagus were very rare.

Dr. IRWIN MOORE agreed that benign growths of the pharynx were very rare. No standard English text-book except Sir Morell Mackenzie's referred to growths of the pharynx or œsophagus, and it was remarkable that this work was almost up to date at the present day. Sixteen years ago such a growth as that recorded would have had to be dealt with by subhyoid pharyngotomy. In 1899¹ a case had been reported of fibromyxoma of the deep pharynx, in which after failure to remove the growth through the mouth by the galvano-cautery snare a tracheotomy was performed, followed by subhyoid pharyngotomy, the patient dying a few days later from septicæmia. The present case exemplified the great advance of endoscopy.

Mr. G. W. DAWSON said that two meetings ago he showed a case of what was supposed to be a laryngeal growth, but it turned out to be a polypus of the pharynx, which had lodged in the larynx. It was attached by a single pedicle to the posterior wall of the pharynx on a level with the arytaenoid cartilages, and consisted of two portions, the smaller of which was free in the pharynx, and the large globular portion lay in the larynx.

Right-sided Recurrent Paralysis with Partial Atrophy of Tongue and Weakness of Soft Palate.

By WALTER HOWARTH, F.R.C.S.

A. L., AGED 36. Alteration in voice noticed four years ago; general ill-health and loss of weight. When first seen two years ago there was complete fixation of the right side of the larynx. X-ray of chest showed "marked coarse striation in upper part of right lung, which suggested commencing new growth." Wassermann reaction negative. A few months later partial atrophy of right side of tongue developed with some difficulty in swallowing and regurgitation of fluids through nose.

¹ W. Permewan, "Two Cases of Tumours of the Œsophagus removed by subhyoid pharyngotomy," *Liverpool Med. Chir. Journ.*, 1899, xix, p. 263.

It is suggested that the condition may be due to a local bulbar palsy (like progressive muscular atrophy). A complete course of antisyphilitic treatment caused no improvement.

Right-sided Recurrent Paralysis with Partial Atrophy and Loss of Mobility of Tongue, difficulty in Swallowing, &c.

By WALTER HOWARTH, F.R.C.S.

LIEUTENANT R. Wounded June, 1916, by a machine-gun bullet which entered the left orbit and destroyed the eye. The wound of exit was 1 in. behind the right mastoid process. There is complete deafness in the right ear, complete paralysis right side of larynx, some difficulty in swallowing, partial atrophy and loss of mobility of the right side of the tongue and considerable dropping of the right shoulder. Probably the bullet in its passage across the base of the skull damaged fibres of the vagus, glossopharyngeal, hypoglossal and spinal accessory nerves in the neighbourhood of the foramen ovale.

DISCUSSION.

Dr. W. HILL (referring to the first case of recurrent paralysis) said that the exhibitor stated "The condition may be due to a local bulbar palsy (like progressive muscular atrophy)." Six years ago, Dr. Bronner asked him (Dr. Hill) to see a patient whom he had been seeing for six or seven years, and whose trouble commenced with paralysis of one side of the larynx. Later there was hemiatrophy of the tongue, and half the pharynx was involved. True bulbar paralysis was never unilateral and is rapidly fatal. Dr. Grainger Stewart told Dr. Hill that he had seen six post-mortems on cases of this unilateral glosso-pharyngo-laryngeal paralysis, and that they were mostly due to a tumour in the pontine angle. Dr. Grainger Stewart thought the condition was not inconsistent with continuation of life for many years. This patient was still living, and the paralysis had been stationary for many years.

Mr. HOWARTH replied that he did not profess to be a pathologist, so he had consulted several eminent neurologists, and their suggestion was that it might be due to a medullary tumour, possibly syphilitic. The contrast between the two cases was interesting as showing similar symptoms and disabilities caused by a central and a peripheral lesion respectively.

Case of Cyst on Vocal Cord.

By W. M. MOLLISON, M.Ch.

MRS. S., aged 38, a trained nurse, was referred to me on July 15, 1920, by Dr. Ensor on account of hoarseness of sudden onset about four months ago. It was worse when she was tired, and towards night. Some years ago she looked after physically and mentally defective children and enlarged glands in the neck developed. These were removed by operation in 1913; the operation scars are well healed.

Nose and pharynx normal. On the right vocal cord at the junction of the anterior and middle third was a small rounded nodule, apparently arising from the edge of the cord, whitish, and closely resembling the cord in colour.

Under an anæsthetic the nodule was removed by the direct method; it measured about 2 mm. in diameter.

Dr. Nicholson kindly examined sections and reported that it was "a cyst lined with ciliated epithelium." Section shown.

Case of Giant-cell Systems in a Tonsil.

By W. M. MOLLISON, M.Ch.

A BOY, aged 6, was referred to me in September, 1920, by Dr. Moore, of Enfield, on account of enlarged glands in the neck. Dr. Still had seen the patient and had advised removal of the tonsils as the source of infection. The tonsils were buried but did not appear different from the majority of tonsils in young children.

The tonsils were enucleated and did not present any unusual features. The left tonsil (the enlarged gland was on that side) was taken for examination. Dr. Nicholson kindly cut sections and reported numerous tuberculous giant-cell systems. Section shown.

DISCUSSION.

Mr. J. F. O'MALLEY said that eight years ago he had a case of this type, with a similar history. There was no sign of tubercle in the tonsil, but it was present in the adenoids. The neck swelling was chiefly in the posterior triangle.

Mr. ROSE said it was easy to discover microscopical evidence of tubercle in the tonsils of patients who had obvious tuberculous glands in the neck. But when sections from the tonsils of children who had not tuberculous neck glands were examined, giant-cell systems would rarely be found.

Dr. DAN MCKENZIE said that in cases of enlarged tuberculous glands in the neck the tonsils as a rule were not enlarged, but were smaller than usual. It was important that in all such cases the tonsils should be enucleated, whether they were large or small.

Mr. W. STUART-LOW referred to a research on this subject by Dr. Wyatt Wingrave, who found that tubercle bacilli were always present both in the glands and in the tonsils.

Dr. DONELAN remarked that although Zuckerkandl found that 75 per cent. of the cases of tuberculous glands were due, in children, to carious teeth, he accepted Mr. Rose's view as holding good in many cases.

Sir WILLIAM MILLIGAN said that at one time he had carried out a number of inoculation experiments on the tonsils and found that the enlarged and protruding tonsil was not usually tuberculous, but that the small, buried tonsil frequently was so.

The PRESIDENT said in his research work on the subject, he had been more successful in finding tubercle bacilli in the more distal lymphatic glands than in those larger and nearer to the site of infection. He had had the same results from inoculating guinea-pigs.

Lympho-sarcoma of Post-nasal Space.

By CHARLES W. M. HOPE, F.R.C.S.

E. P., AGED 34, was admitted to King's College Hospital on September 14, 1920, with nasal obstruction and occasional blood-stained discharge from nose of three to four weeks' duration.

Post-nasal space was occupied by large bluish-red mass, pushing down the soft palate, which was also invaded by a large mass behind the left posterior pillar of the fauces. Smaller mass on right side, in same region. Wassermann reaction negative. Scattered glands both sides of neck, in front and behind sternomastoid, down to clavicle. One removed from left side. Microscopic report: Lympho-sarcoma.

Treatment.—September 23, 1920: 60 mg. radium, in two tubes, buried in the post-nasal growth; six hours, 1 mm. silver screen. September 29: X-rays to the neck. October 5: X-rays to the neck.

October 9: 30 mg. radium put in post-nasal space, and 30 mg. buried in the left posterior pillar; six hours' exposure, 1 mm. silver screen.
October 12: X-rays to neck.

To-day (October 19) post-nasal space is seen to be absolutely free of any tumour, pillars are very much smaller, and glands in the neck are reduced two-thirds in size. All nasal obstruction has disappeared.

DISCUSSION.

Mr. HERBERT TILLEY said that some years ago he brought to the Section a clergyman, aged 72, who a few months previously had consulted him for an enlarged left tonsil, which had given him a "throaty" voice. As the patient seemed somewhat decrepit, a radical operation did not seem advisable; consequently he used the galvano-puncture about twice weekly. To his astonishment, the tonsil practically disappeared. A few months later, however, the patient came again, complaining of a discharge from the left ear and some nasal obstruction. This was due to a sarcomatous structure in the post-nasal space. After one or two insertions of radium the growth disappeared, breathing was re-established, and the ear discharge ceased. When next he came, he had a mass the size of a goose's egg under the lower end of the right sternomastoid. Radium (in surface applications) was again applied, and the growth disappeared. About ten months after that he, the speaker, had an inquiry from Sir Anderson Critchett as to the nature of the patient's previous troubles, as there was now proptosis of the left eye, probably due to recurrence of the tumour in the orbit. For this the eye was removed. The patient became very anæmic, and entered a nursing home, where an acute attack of hæmatemesis brought about the end. The radium had cleared up the successive tumours, and fresh ones appeared, until the termination of the disease as already stated. In view of such a history he would hesitate to give a favourable prognosis in the present case.

Sir WILLIAM MILLIGAN said that an important point was the possible relation of the radium applications to the secondary blood changes. He had at the moment a man under his care whose lymphosarcoma had been under treatment by radium, which dispersed it, but there was recurrence eighteen months afterwards, in almost the same situation, and that was also dispersed by the same means. But the man's anæmia was now so pronounced that he was practically unfit for anything. He had another patient with a diffuse nasal sarcoma, who likewise had radium, and he had similar blood changes. Such acute blood changes were not so noticeable in subjects of lymphosarcoma who did not have radium. In this case 60 to 30 mg. was applied, which he regarded as a small dose; massive doses seemed better.

Dr. W. HILL did not regard this as a very bad case, as the growth did not go far into the nasal passages. The first case of the kind treated by radium in this country was done by Mr. Hope and himself ten years ago, but in that case

8 Hastings: *Diagnosis of Carcinoma of the Larynx*

it could be no more than palliative, because the maxillary tuberosity, the pterygoid region, and the palate were invaded, as well as the ethmoid and possibly the sphenoid. Remarkable improvement ensued: it had been thought the man might die in about a month, but he was seen alive eighteen months later. About 200 mg. of the salt were used. He warned members to make quite sure by a Wassermann test that an apparent lymphosarcoma was not one of syphilis. He had applied radium in cases of gumma of the nasopharynx and palate with splendid results.

Mr. ANDREW WYLIE said he had a case very similar to Mr. Hope's some years ago, in which the patient contracted erysipelas. He was very ill for a fortnight, but at the end of three weeks the sarcoma had disappeared, and it had not recurred.

Mr. HOPE replied that he did not regard this as a favourable case. When he first saw the patient there were enlarged glands extending to the clavicle, and the great anaemia referred to by members might have been due to extension of the disease itself, not necessarily to the radium. These growths could persist a long time without killing, but all the time causing secondary anaemia. At King's College Hospital, these cases were treated by means of a small torpedo-shaped needle containing the radium, a little thicker than the lead in a pencil, and $\frac{1}{2}$ to $\frac{3}{4}$ in. long, having a small ring at one extremity to which a silk ligature was attached. The needle was buried in the growth by means of Spencer Wells' forceps.

Case illustrating the Difficulty in Diagnosis of Carcinoma of the Larynx.

By SOMERVILLE HASTINGS, M.S.

ON February 28, 1919, A. B., a woman aged 52, came to the Middlesex Hospital complaining of loss of voice for two years, and more recently, pain on swallowing and shortness of breath. The left cord was normal but the right was completely covered by red sprouting granulations. The movement of both cords was good. A tracheotomy was performed, and on three separate occasions, the granulations were snipped away, microscoped, and reported epithelioma, the report being confirmed by Professor Shattock. Two Wassermann tests were reported negative, but excision of the larynx was not performed owing to the severity of epileptic fits.

The condition remained unchanged till January, 1920, when potassium iodide was given. By the end of January the larynx had become normal, and has remained so ever since.

The exhibitor does not regard the case as one of epithelioma, as cell nests have never been seen in the microscopic sections.

DISCUSSION.

Mr. HOPE said that eighteen months ago he saw a man who apparently had a papilloma of the vocal cord, which had spread to the other cord. He was now quite well, though the microscope showed, very definitely, that it was an epithelioma. He saw no reason for Mr. Hastings' doubt about the pathologist's opinion: since a large number of epitheliomata continued for a long time, running a comparatively innocent course, in elderly patients.

Mr. F. ROSE said he found in this patient no evidence of epithelioma or any important disease in the larynx. From examination of the sections one got the impression that there was a growth there, though it was open to doubt whether it was epithelioma. If this section had been submitted to him, his answer would probably have been an evasive one.

Dr. KELSON considered that the patient was much to be congratulated. The growth had now disappeared, following iodide of potassium treatment.

Mr. SOMERVILLE HASTINGS, in reply, referred to the fact that the patient was only saved from excision of the larynx through suffering from epileptic fits.

Two Cases showing Results of Treatment of Lupus by Sodium Iodide and Ionization (Copenhagen Method).

By DOUGLAS HARMER, M.Ch., and T. H. JUST, M.B.

Case I.—Male, aged 18. Patient had active lupus in the upper part of the vestibule on each side of the nose. The whole of the hard palate and the anterior part of the soft palate were covered with nodules. The epiglottis was nodular and partly ulcerated. The arytaenoid and inter-arytaenoid space swollen. During four months he has had thirteen treatments with ionization, the last on July 22, 1920.

Case II.—Male, aged 41. Previously suffered with lupus eleven years ago. Before treatment the skin covering the cartilaginous parts of the nose was greatly thickened and swollen. The anterior nares and columella were ulcerated over their whole surfaces and were covered with crusts. In seven months the patient has had fifteen treatments with ionization. The photograph was taken after six treatments.

Both cases are still under treatment.

DISCUSSION.

Mr. HARMER (amplifying the notes) said that when he was in Copenhagen in 1911 he found they had abandoned all forms of treatment of lupus of the mucous membranes except the method now described. Nurses trained to the work were giving three applications a week. Single doses of sodium iodide, 60 to 120 gr. were given, and two hours later when the iodide was in the circulation, either single or multiple needles were inserted deeply into the affected tissue for ionization with the positive pole. It was claimed that in this way iodine was liberated into the tissues causing the destruction of the tubercle bacillus. With regard to the duration of treatment necessary, he was told in Copenhagen that whereas formerly patients used to remain in the city two or three years, with this method the period was reduced to two or three months.

Dr. A. LOGAN TURNER said that so much lupus was seen in the North that he was glad to receive any fresh hints for its treatment. For a time the sodium iodide treatment was carried out at his hospital, combined not with ionization but with oxygenation. In the nose, plugs of gauze were used soaked in peroxide of hydrogen. The patients themselves replenished the plugs by means of a pen-filler two or three times daily. For a time improvement was thought to be taking place. The idea was the same, that iodine was being liberated by the oxygen; but careful observation for a time convinced them that their expectations had not been fully realized. He asked whether Mr. Harmer had tried the liberation of iodine by ozone or by peroxide of hydrogen, and if so, whether the results were as good as those he now showed.

Mr. H. LAWSON WHALE asked what strength of current was used by Mr. Harmer in these cases. A few years ago he (the speaker) tried a single case, and he then gave a drachm of sodium iodide and a current of 5 ma. The strength of current seemed an important factor.

Mr. HARMER replied that they had tried the peroxide of hydrogen treatment extensively, but its results did not compare with those yielded by this method. The strength of current used depended on the number of needles inserted at one time. With a single needle, 5 to 7 ma. was strong enough, but with ten needles, up to 30 ma. could be used. The current was continued for five to twenty minutes, care being taken not to produce coagulation of the tissues.

Actinomycosis of the Superior Maxilla.

By DOUGLAS HARMER, M.Ch., and T. H. JUST, M.B.

MALE, aged 59, butcher's assistant. In February last tooth removed for relief of abscess of upper jaw. Subsequently face swelled from time to time and pus escaped externally. In April œdema of lower

eyelid. When first seen had marked periosteal swelling of front of right maxilla with redness and œdema. X-ray showed no foreign body. A subperiosteal abscess was opened and the pus found to contain actinomycotic granules. These were cultured and an autogenous vaccine prepared. The patient has been treated with this vaccine (dosage 5 to 100 mils) and potassium iodide up to 120 gr. for a period of two months. The inflammation is slowly subsiding.

Large Fibrous Tumour of Cheek.

By W. LLOYD, F.R.C.S.Ed., and WILLIAM HILL, M.D.

COMMENCED as a small growth on the inner side of the left cheek, after patient bit the cheek twelve years ago. The tumour has only acquired its large size since last year. It does not appear to have any relation to Stenson's duct and looks as if it could easily be enucleated by dissection. It was thought to be a fibrolipoma but microscopic sections show fibrous tissues only.

Mr. W. STUART-LOW regarded the case as almost unique. He thought it might be a cystic fibroma.

Laryngeal Tumour for Diagnosis.

By W. STUART-LOW, F.R.C.S.

PATIENT, a man aged 72, has been employed for forty years in a drapery business where there is much dust. He has been an inveterate smoker all his life. He has suffered from hoarseness for three years, more marked during the last six months. On the anterior half of the left vocal cord, which moves freely, there is a prominent round smooth swelling attached by an elongated base. It has the appearance of a fibroma.

Opinions are invited as to its nature and the treatment advised.

DISCUSSION.

Mr. J. F. O'MALLEY agreed that the cords moved well. He considered that this was an innocent growth, which might be removed with Dundas-Grant's safety-forceps.

Dr. SYME agreed that it was probably a fibroma, and advocated its removal by means of suspension laryngoscopy.

Mr. MARK HOVELL thought the growth was innocent, since there was not the infiltrated surface usually seen in a malignant growth.

Laryngeal Tumour for Diagnosis.

By A. L. MACLEOD, M.B.

PATIENT, a female, aged 55, contracted a severe cold six weeks ago and lost her voice. She has some cough, but no expectoration, and the symptoms somewhat suggest whooping cough. There is no dysphagia, but a frothy mucus collects in the deep pharynx. Enlarged glands have been present on the right side of the neck for five weeks. Examination of the larynx shows a large ulcerating tumour growing from the right arytenoid region. Opinions are invited as to the nature of the growth and its treatment.

DISCUSSION.

Mr. DAWSON thought it looked malignant. He had on a previous occasion shown to the Section a tumour of the base of the tongue, which was pronounced malignant, but it disappeared of itself and the present one might possibly do the same.

Mr. E. D. D. DAVIS had no doubt that this was a carcinoma ; there were secondary growths in the cervical glands. He saw a similar case which was found by Mr. Clogg to be inoperable. Post-mortem examination showed a large cauliflower-like growth which arose from the posterior wall of the pharynx. He had that day seen another case almost identical, which was a carcinoma. He considered the present case inoperable, but if there was any doubt about the diagnosis the glands could be removed first.

Mr. J. F. O'MALLEY agreed with Mr. Davis's diagnosis, that the growth was an epithelioma.

Section of Laryngology.

President—Dr. W. JOBSON HORNE.

Dentigerous Cyst (Follicular Odontome) of the Upper Jaw.¹

By DOUGLAS GUTHRIE, M.D.

SEVEN months before coming to hospital, this patient, a boy, aged 8, while drinking from an iron cup, was jostled by another boy, so that the cup struck his upper lip forcibly. A few weeks later, a swelling was noticed beneath the lip on the right side, and this has gradually increased in size.

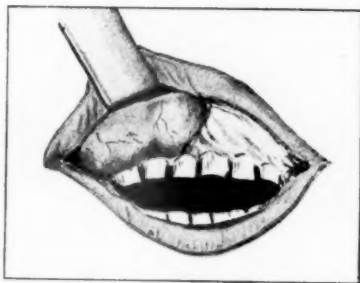


FIG. 1.

Dentigerous cyst of upper jaw.



FIG. 2.

Dentigerous cyst removed entire.

July 20, 1920: On everting the lip, a swelling was seen over the roots of the teeth, from the first bicuspid to the middle line. It was painless, smooth, and sharply circumscribed, and on palpation a "parchment sensation" was elicited. Unfortunately no skiagram could be obtained.

¹ At a meeting of the Section, held December 3, 1920.

August 4, 1920: Operation. Horizontal incision; mucosa reflected; thin anterior bony wall removed; cyst separated and removed entire, leaving bony cavity the size of a walnut. The cyst (*see figure*) contained the crown of a tooth embedded in its wall, and another tooth, in process of development, was found lying loose in the bone cavity after removal of the cyst. A large opening was made through the roof of the cavity into the nose. B.I.P.P. was applied and the mucosa stitched. Uneventful recovery followed.

The points of interest are: (1) Probable traumatic origin; (2) relative rarity in upper jaw; and (3) completeness of specimen (as a rule adherent and therefore destroyed during removal).

Specimen and drawings were shown.

DISCUSSION.

Mr. E. D. D. DAVIS congratulated Dr. Guthrie on the excellent and valuable specimen shown. He had found that opening such cysts into the nose was not so satisfactory as dissecting them out from the mouth. These cysts were situated below the floor of the nose and for that reason drainage into the nose was imperfect since nasal secretions collected in the cavity of the cyst, and frequently a permanent fistula resulted. He had seen a number of cysts at the Royal Dental Hospital and had operated on twenty-six cases, and when the cyst had been opened into the nose he had always regretted it. There was never any difficulty in shelling out a cyst, particularly a dentigerous cyst. Dentigerous cysts were not traumatic but developmental in origin and were considered to be due to the failure of eruption of a tooth. In their Report on Odontomes, Gabell, Warwick James, and Lewin Payne published a series of eighty-four dentigerous cysts and traumatism was not mentioned. These cysts were painless, developed slowly and insidiously, and were frequently only accidentally discovered. In stating that dentigerous cysts were relatively rare in the upper jaw, Dr. Guthrie was possibly confusing them with epithelial odontomes. In a series of epithelial odontomes the proportion was eleven in the mandible to one in the maxilla.

Dr. GUTHRIE (in reply) said he had been in doubt as to the advisability of making a counter-opening in the nose in these cases: such treatment was unnecessary for a small cyst. He had mentioned trauma as a possible cause in this case because the blow was exactly on the spot from which the cyst subsequently grew. He had understood that dental cysts were common in the upper jaw, while dentigerous cysts were rather rare. He had presented the specimen to the Section's Museum.

Chronic Superficial Abscess of Left Frontal Sinus.

By ARCHER RYLAND, F.R.C.S.Ed.

H. Y., A BOY, aged 15, was seen on July 19, 1920, and complained of nasal stuffiness, with occasional aching pain in the forehead. He had had some nasal obstruction for two or three months. Some nasal polypi at each middle meatal region. No frontal swelling. Nothing directing attention to frontal sinuses.

July 29: Nasal polypi removed.



September 27: Patient reappeared at hospital with frontal swelling as in photographs: stating that swelling began to appear on September 15. On questioning, it was ascertained that he had had a similar swelling of the forehead, some days before his first visit to hospital, and that it had subsided, following a "mattery discharge" from the nose.

On examination: Re-formation of nasal polypi right and left; frontal tumour—centrally placed, soft, fluctuating, painless, no œdema; frontal sinus cannula passed readily into left frontal sinus. Transillumination: frontal sinuses dark. Skiagram: "No abnormality of frontal bone or of sinuses is present" (Dr. Ironside Bruce).

F—L 1a

October 6: Operation. Pus evacuated on incising skin. Periosteum found upstripped in places, sloughing and oedematous; fistula through anterior wall of left frontal sinus; opening enlarged by removal of diseased bone round its edges; rubber drainage to nostril; complete closure of external wound.

Pathological report on specimen of tissue forming the abscess wall: "Section shows septic granulation tissue: no evidence of cyst."

Report on specimen of pus from swelling: "Films show staphylococci" (Dr. Scott Williamson).

November 17: Still some pus discharging on to forehead. This is getting less as result of lavage of the sinus, and introduction of B.I.P.P. into cavity.

Photographs and skiagrams were shown.

DISCUSSION.

Mr. TILLEY said the surgical result in this case appeared to be perfect, and suggested that where a large area of frontal bone was involved, as from osteomyelitis, it was preferable from a cosmetic point of view to make the incision just beyond the line of the hair margin, carrying it downwards into the temporal fossa and then forward to meet the outer end of the eyebrow incision. The flap so formed healed by immediate union, and practically no scar was left.

Mr. ARCHER RYLAND (in reply) said the distribution and character of the frontal swelling suggested a cystic tumour or mucocoele, and for this reason the long vertical incision had been made. He was fully in agreement with Mr. Tilley in cases of extensive operation on the frontal bone.

Case of Laryngocele.

By FREDERICK SPICER, M.D.

C. H., AGED 68, an organist, was sent to hospital for gradually increasing deafness. It was there his hoarseness was noticed.

History: One night twenty-two years ago, after getting wet through in the snow, he was seized with a severe attack of croup, accompanied with violent coughing. He became hoarse then and there and has remained so ever since, the voice never changing from that day to this.

The doctor under whom he then was, and has been ever since, states that "as we see the larynx to-day, so it was twenty years ago."

On examination: (a) In quiet respiration—The right cord is seen to be normal. The left cord is swollen and discoloured and covered in its anterior fourth by a fold of mucous membrane. The left ventricular band is reddened, thickened and corrugated. There is no obstruction to the passage of air. (b) On expiration—On getting him to say "Ah," a swelling appears—a smooth and globular tumour. It looks like a quantity of air enclosed in a bag of distended mucous membrane. It starts to fill from the anterior part of the ventricle and when distended completely fills up the left ventricle and covers the opposite cord and blocks the airway.



FIG. 1.
In quiet respiration.



FIG. 2.
On saying "Ah."

DISCUSSION.

Dr. W. HILL regarded it as a diverticulum from the ventricle of the larynx. In some of the lower animals—e.g., the "howling monkey," laryngoceles were normal; a large pouch went out from the ventricle of each larynx, through the thyro-hyoid membrane into the axillæ. The monkey, playing on the sac-like bag, a sort of bagpipe, produced his howl. As the present sac followed immediately on a fit of coughing, trauma was suggested as the cause. The patient might have had a big ventricle that got inflated, and so caused the sac. Very few pouches were of traumatic origin; generally there was some congenital weakness at the point of origin, and the gradual expansion caused the diverticulum or laryngocele. On removal it could be seen whether it was an air-sac, or whether it communicated with the ventricle. He doubted whether removal would cure the hoarseness, as there was pachydermia near the vocal process.

Mr. TILLEY thought that it was an ordinary soft fibroma of the larynx which had undergone cystic degeneration. The tumour hung downwards, and when the man phonated or gave an expiration it got blown up like a flap on a

folding table. He considered it grew from the anterior half of the vocal cord and he would be much interested to hear later which of the views which had been expressed was correct.

Dr. BANKS-DAVIS thought the sac bulged from the ventricle. On phonation, air was driven into the ventricle, and when breathing stopped the sac collapsed. He regarded it as an "air-sac."

Dr. IRWIN MOORE thought this one of the very rare cases of prolapse of the sacculus laryngis. At a meeting of the Section in 1909,¹ he had shown a similar case of laryngeal growth for diagnosis, but at the time no diagnosis was made. The patient had been hoarse for eighteen years. A grey, cystic-looking growth covered the anterior half of the left vocal cord and protruded into the glottis. Removed by Sir StClair Thomson with Mackenzie's forceps, it was found to be simple granulation tissue. Morell Mackenzie referred in his work to only three cases as having been recorded up to 1881, only one of which was recognized during life. In 1882 two cases were described,² one by Solis-Cohen, in which the condition was suggested by the continuity of the ventricular margin into the tumour, also by the fact that the tumour could be easily pushed back into the ventricle with a probe, to reappear again on movement of the cords. The second case, described by Louis Elsberg, was bilateral, and there was a history of twenty years' hoarseness. Some of the cases reported were said to be congenital, whilst others were regarded as traumatic in origin—e.g., from violent coughing or blowing of wind instruments. He believed that this would prove to be a typical case of prolapse of the sacculus laryngis.

Sir STCLAIR THOMSON did not think he had seen a case of laryngocele. The present case did not purport to be a laryngocele, but a "prolapse of the ventricle." He believed that, though several conditions might give this impression, yet no actual eversion of the sinus had ever been demonstrated, and he doubted that such an event could happen. He referred to some cases which were supposed to be instances of prolapse of the ventricle of Morgagni, but which turned out to be small fibromata originating along the attached border of the cord, and becoming cystic. The cystic part had replaced the fibrous part. He suggested that Dr. Spicer should first puncture the sac, and note whether fluid came out, or only air. Then he could wait a little to see whether it filled up again, and if so, it could be completely removed. It would be valuable to have a microscopical report on it.

Dr. DAN MCKENZIE said the tumour, in his opinion, was filled with air. It expanded and collapsed like an air-balloon. The idea of a cyst, however, did not seem improbable. It might have originally been a cyst which had burst and remained open in such a way that every time the glottis closed and

¹ *Proc. Roy. Soc. Med.*, 1909, ii (Sect. Laryngol.), p. 113.

² *Arch. Laryngol.*, 1882, iii, pp. 66-70.

the air-pressure below it was raised the empty cystic cavity became inflated and expanded.

Mr. LAYTON thought it was a question of observation as to whether this was a mass which flopped up on expiration or whether it was a balloon which filled with air. Personally he thought it to be the latter. He did not think in this case there was any analogy with the monkey, the history of trauma being too definite. He would like to know what the patient thought about treatment; he had not consulted a doctor for this complaint. He was aged 68, and the condition had existed for twenty-two years without any operative interference; the speaker thought that well should be left alone. Nor did he think the anatomical condition would ever be proved by any endolaryngeal removal. A complete examination of the larynx after death alone would do this.

Dr. D. R. PATERSON agreed with Dr. McKenzie's view of the local appearances but he was against leaving it alone. The patient needed great effort to produce his voice, and anything which reduced the swelling would make matters easier for him. He hoped Dr. Spicer would carry out Sir StClair Thomson's suggestion, and report further.

Mr. LAWSON WHALE said he showed a case before the Section some years ago, and there was a debate as to whether it was an eversion of the laryngeal ventricle or a fibroma. A histological report showed that the epithelium which should have lined the cavity was, in this tumour, circumferential. Therefore it seemed it was a case of eversion of the laryngeal ventricle.

Dr. KELSON said it certainly looked like a bag of air, but it was more likely to be a cyst (like a grape) which popped out of the ventricle when the patient phonated than a loose membrane inflated like a balloon.

The PRESIDENT said that, as the outcome of his own researches and observations on tumours of the ventricle, he totally disagreed with Sir StClair Thomson's statement that prolapse of the ventricle did not occur, or that no proved specimen existed. He possessed a specimen from a case in which sudden prolapse of the ventricle occurred. The patient suffered from a gumma of the larynx, and a portion of the cartilage to which the ventricle was attached gave way and the ventricle prolapsed into the glottis, and killed the man before tracheotomy could be performed. If one tried, at autopsy, to dissect away the cartilage from the ventricle, it would be found that the ventricular lining was insecurely attached and it was possible that coughing might cause its prolapse. The history of most cases was a sudden onset, associated with some spasm such as coughing. He advocated removal of the tumour in this patient, as it might not always pass back so easily, and the patient might find himself in difficulties. The size of the swelling was out of proportion to the size of the ventricle, due perhaps to over-distension. In this case he thought there might have been a congenital cyst

lying dormant, which had suddenly protruded into the larynx. He advised puncturing it, but did not think it contained fluid, and saw nothing about it to suggest a fibroma.

Mr. WOAKES thought it was a case of traumatic emphysema. He had seen a case of eversion of the ventricle with his father in 1889, and he made a rough sketch of it. The patient was an old man, who had been coughing a good deal. An effort to replace the sac succeeded to some extent. Eventually it was burned away by means of the galvano-cautery. Against the swelling being a fibroma or cyst was the manner in which it came into view, also a growth of such size and weight would interfere more with the patient's respiratory comfort.

Dr. SPICER (in reply) said he had not previously seen such a case, and could not find its parallel in the literature. A number of cases of prolapse of the ventricle had been recorded by American writers, but they all differed entirely from this case. He would show the patient again after treatment.

Case of Congenital Laryngeal Web.

By R. A. WORTHINGTON, F.R.C.S.

I. N., FEMALE, aged 10, whose vocal cords are seen to be united in their anterior half by a pinkish, slightly translucent web. The symptoms chiefly complained of are hoarseness of the voice and dyspnoea on exertion. According to StClair Thomson¹ only twenty-three such cases are on record. Suggestions as to treatment invited.

DISCUSSION.

Dr. W. HILL mentioned a similar case in an adult which he exhibited some years ago, and later performed laryngo-fissure. He inserted a celluloid splint in the larynx, which was retained for three weeks while the cords were cicatrizing. He showed his patient on a later occasion, without the web. The case had been operated upon previously, by himself and others, *per vias naturales*, but unsuccessfully.

The PRESIDENT said a good many cases of webs, traumatic in origin, had been seen lately, resulting from through-and-through wounds, but they did not respond very well to treatment.

¹ "Diseases of the Nose and Throat," 1916.

Mr. J. F. O'MALLEY said he had shown a child aged 7 with a web between the vocal cords. He severed the web, but on account of a severe reaction he was unable to keep the larynx open, and the condition recurred.

Dr. H. BANKS-DAVIS said it was important to do something for the condition because of its restraint of the growth of the larynx. His idea was that it might have been due to some ulceration, but the mother said there had been difficulty in breathing ever since birth. The cautery could be used first and if this failed other measures be taken later.

Mr. E. D. D. DAVIS said he had seen a well-marked web in a fireman, aged 23, and there was no want of development of the larynx or of his physique, but he was hoarse and would not consent to operation unless an improved voice could be guaranteed. Mr. Barwell had had a case in which he removed a web for laryngeal obstruction, but the stenosis recurred.

Sir STCLAIR THOMSON suggested dividing the web *per vias naturales*, and the wearing of an O'Dwyer tube for some months. The result of that might be more fortunate than that of laryngo-fissure. He had operated upon webs produced by diphtheria, and with a satisfactory result, but it required patience, and might mean spending a year or more on the case.

Mr. WORTHINGTON, while thanking members for suggestions, was afraid of doing laryngo-fissure in so small a child; he thought he would leave the case for a time and see what happened. The only disabilities were occasional slight shortness of breath on exertion of unusual degree, and hoarseness. Possibly the operation, however successful, might not result in cure.

Case of Œdema of the Larynx for Diagnosis.

By Sir JAMES D. DUNDAS-GRANT, M.D.

A MAN, aged 57, presented himself in June, 1919, who for three weeks had had a swelling over the upper part of the larynx and hoarseness on and off for two years. The epiglottis and aryepiglottic folds were the seat of smooth infiltration. The prelaryngeal swelling was subsequently opened by a surgeon, but there is no record of the nature of its contents (it was probably an abscess in the prelaryngeal gland). The larynx has remained more or less *in statu quo*. From time to time the search for tubercle bacilli has been negative; the physical signs in the chest are extremely indefinite. The diagnosis of tuberculosis is, however, the most probable one, the Wassermann reaction being negative and the urine normal.

A recent X-ray examination of the lungs shows "Apices opaque and fibrosed. Peribronchial shadows present. Many small discrete calcareous patches suggesting old infiltration. Doubtful presence of recent infiltration."

DISCUSSION.

Sir STCLAIR THOMSON thought this would prove to be tubercular; if it were his case he would treat it on that suspicion. He had a case in a medical man in whom tubercular disease began in his larynx, and he died of it, yet tubercle bacilli were never found in his sputum to the day of his death.

Dr. W. HILL regarded the case as one of chronic lupus, of four years' standing.

Fixation of the Arytænoids in a Case of Osteo-arthritis.

By ARTHUR J. HUTCHISON, M.B.

A LADY, aged 48, consulted me in August, 1919. She was crippled by arthritis, from which she had suffered for fifteen years. For the last eighteen months stridor was produced by very slight exertion and came on almost every night, and the voice varied from a hoarse whisper to a squeak. The arytænoids were fixed close together, swollen and red; the cords left only a narrow elliptical opening during respiration, which was slightly narrowed during phonation. Pyorrhœa alveolaris was the only septic focus discovered. All her teeth (twelve) were extracted; thereafter improvement began. The arytænoids are now almost normal in appearance, separate about $\frac{1}{4}$ in. during respiration, and approximate on phonation. Stridor has quite disappeared, and the voice is good except after over-use. She can easily walk a mile.

A Problem in Diagnosis: Division (?) of both Recurrent Laryngeal Nerves; Bilateral Abductor Paralysis.

By DAN MCKENZIE, M.D.

THE patient is a woman, aged 44. She has had a goitre for many years. At the age of 14 the right lobe of the thyroid was removed, and at the age of 40 the left lobe was removed. Immediately after

the second operation, indeed as soon as she recovered from the anæsthetic, stridulous breathing was observed, and it was so loud that it kept the other patients in the ward awake at night. This continued until two years ago, when a high tracheotomy was performed and a tube inserted. She is still wearing it, and, as laryngeal examination shows, for the reason that the vocal cords are in the position of adduction, their edges being in contact. With deep inspiration a very slight effort at abduction is made and a slight chink is evident between them.

There is no sign of any nervous disease.

The appearance of the stridor immediately after operation proves that the injury to the second nerve must have been operative, and not due to post-operative cicatricial dragging. The problems raised by the case are obvious. Two explanations may be offered:—

First, that the nerves were actually divided, the right at the first, the left at the second operation. If this is correct, then obviously complete recurrent laryngeal paralysis may leave the cords in adduction; needless to say such an explanation is unorthodox.

Secondly, that the nerves have not been divided, but have sustained injury at the operation short of actual division, with the result that the dilator fibres, being the more vulnerable, have lost conductivity, while the contractor fibres retain it.

But the explanation assumes that the same minor operative trauma overtook both nerves, first that on the right side, and secondly, twenty-six years later, that on the left. Rather a remarkable coincidence!

Incidentally, the patient is anxious to be rid of her tube as she is a maid-servant and finds it hard to get a place. Would it be worth while removing the vocal cords under suspension, or should we wait in the hope that complete recurrent paralysis may supervene and remove the glottic obstruction?

There is no need to add that the position of the cords is not due to the high tracheotomy, as the stridor was present two years before the tracheotomy was performed.

Paralysis of Recurrent Laryngeal Nerve after Thyroidectomy.

By T. B. LAYTON, M.S.

PATIENT, a female, aged 45, after suffering from a severe form of Graves' disease since September, 1912, had the right thyroid lobe excised in July, 1914. Following the operation patient became hoarse owing to abductor paralysis on the right side. The hoarseness continued for six months before the voice returned to normal.

DISCUSSION.

Mr. HOWARTH said he had seen a large number of cases of this kind of paralysis after thyroidectomy, and he thought the explanation was an anatomical one. He produced an actual specimen, and demonstrated the recurrent laryngeal nerve, before going into the larynx, breaking up into a leash or plexus. That was probably invariable, and it was, he said, almost impossible to enucleate the lateral lobe of the thyroid without damaging one of these branches. Some years ago he arranged with one surgeon to allow him to see a series of twenty thyroid operation cases, and of these twenty the cord was paralysed in every case. At the time of operation by means of a direct laryngeal tube he had demonstrated to surgeons that the cord was paralysed the moment following removal of the thyroid lobe. He believed the damage was always done at the time of the operation, and that it did not arise from post-operative cicatrization. Only a small portion of the recurrent laryngeal nerve entered the larynx by the inferior crico-thyroid articulation. The duration of the paralysis was very variable.

Mr. E. D. D. DAVIS said he had seen a number of cases in which one cord was paralysed as a result of division of the nerve. One case he had seen periodically for five years and the cord was from the first immobile and in the cadaveric position and remained so in spite of electrical and all other kinds of treatment. The voice did not improve and the usual compensatory overaction of the unaffected cord, as in Mr. Layton's case, did not occur. The recurrent laryngeal nerve was frequently injured when the capsule of the thyroid was removed in performing an extirpation operation, and did not occur when a tumour was enucleated. He had been present at an operation when a surgeon was extirpating the left lateral lobe of the thyroid and, to facilitate removal, considerable traction was exerted on the gland with free use of the scissors. The patient's breathing immediately became stridulous and obstructed and the anaesthetist stopped the operation for a few minutes. A later examination

of the larynx showed a complete recurrent laryngeal paralysis of the left cord. In these cases, there was slight movement of the arytaenoid because the arytaenoid muscle was not completely paralysed and might receive an additional nerve supply from the external laryngeal nerve. He had seen only one case similar to Dr. McKenzie's, that of a woman who developed laryngeal obstruction after extirpation of both lobes of the thyroid. A tracheotomy was necessary twelve months after operation and the condition was unaltered when she was seen again five or six years later. In these cases the cords remained adducted because the cricoid, thyroid and arytaenoid muscles were not paralysed and the cords were sucked together by inspiration. Mr. Berry had recorded a similar case¹ in which he performed laryngo-fissure to remove both cords. The stenosis recurred and a second operation was performed to remove the scar tissue with temporary success, but stenosis recurred. Mr. Davis advised laryngo-fissure for removal of the cords, but to excise the cords under suspension would be difficult and dangerous.

Dr. H. BANKS-DAVIS thought cases of the kind were quite common, but general surgeons, who usually did these operations, did not seem to be aware of that fact. It was a very bad sequel, and if patients were given the choice they would prefer their tumour left alone. He referred to a case of his own in which he advised that a unilateral cyst should not be operated upon, but the patient insisted on operation and had it removed by a surgeon, with the result that she became voiceless. Eighteen months later she returned with a voice, compensation having taken place, but the right cord was still motionless. Surgeons ought certainly to be aware of the risks which Mr. Howarth had demonstrated.

Mr. MUSGRAVE WOODMAN agreed that these cases were very common. The inferior thyroid artery broke up into numerous branches before reaching the gland, and each had to be ligated separately. The recurrent laryngeal nerve ran in close contact with the artery, and was often adherent to the capsule of the gland itself. Three years ago, in removing a lateral lobe, although aware of the danger, he put a forceps on the bleeding point and recognized from the change in the character of the respiration, that the recurrent nerve had been damaged. The forceps was at once removed. The patient's voice gradually returned as she acquired compensation, and six months after the operation she had a normal voice, but the cord remained paralysed.

Mr. RYLAND thought that in Dr. McKenzie's case there was some abductor power on the left side, but the right cord was quite fixed in the middle line. If the larynx was left alone, the left cord might take up the cadaveric position, and the tracheotomy tube could then be dispensed with. In Mr. Layton's case, the left cord was abducting fairly freely.

¹ Berry, J., "Diseases of the Thyroid Gland," p. 309.

26 Layton: *Paralysis of Recurrent Laryngeal Nerve*

Dr. KELSON considered that the cords in Dr. McKenzie's case were not in the position of complete recurrent paralysis; he thought some mechanical obstruction was present. A high tracheotomy had been performed, and he considered that some ankylosis accounted for the peculiar position.

Mr. LAYTON replied that the question of enucleation of a cyst did not apply in a case of removal of one lobe alone.

Section of Laryngology.

President—Dr. W. JOBSON HORNE.

Tumours of the Ventricles and of the Ventricular Bands—commonly called the False Cords—of the Larynx. An Epidiascopic Demonstration.¹

By W. JOBSON HORNE, M.D. (President).

(SYNOPSIS.)

THE demonstration was restricted to innocent tumours and granulomata and to cases and specimens forming part of original work by the author.

Tumours of the ventricular bands were included inasmuch as, and only so far as, they simulated tumours developing from the ventricle itself.

The term ventricle was used in the commonly accepted and comprehensive meaning of the older writers on laryngology to include the sacculus laryngis, or such part as may be left of that vestigial structure of anthropoid and other apes.

TUMOURS OF THE VENTRICLE.

(1) *Eversion*, or *prolapse*, at times called *hernia* of the mucous membrane reflected over the ventricular band and attached to the inner face of the thyroid cartilage, returning over the vocal cord and forming the ventricle of the larynx.²

The specimen referred to in the discussion at the December meeting of the Section was demonstrated. The left ala of the thyroid cartilage was involved in a gummatous necrosis, and this had led to the detachment, prolapse and eversion of the mucous membrane lining the ventricle.³

The specimen demonstrated that prolapse of the ventricle was not merely a traditional theory but an entity.

(2) *Solid pedunculated tumours* springing from the vault of the ventricle: histologically innocent and suggestive of a supernumerary ventricular band, tending to present at the mouth of the ventricle as a solid tumour.⁴ A rare occurrence.

(3) *Pseudo-cystic tumours* formed by the fusion of two such buds springing from the vault of the ventricle, into one tumour and emerging from the mouth of the ventricle, also of rare occurrence. The tumour removed from a case brought by the author before the Society in 1910,⁵ upon examination presented this appearance.

(4) *True cystoma of the ventricle*, congenital in origin, but rare. The case brought to the December meeting was probably an example.⁶

¹ At a meeting of the Section, held February 4, 1921.

² F. H. Bosworth, "A Treatise on Diseases of the Nose and Throat," 1892, ii, ch. 43.

³ Vide *Proc. Laryng. Soc. Lond.*, 1900, vii, p. 40.

⁴ Vide *Proc. Laryng. Soc. Lond.*, 1898, v, p. 98.

⁵ *Proc. Roy. Soc. Med.*, 1910, iii (Sect. Laryng.), p. 158.

⁶ *Proc. Roy. Soc. Med.*, 1921, xiv (Sect. Laryng.), pp. 16, 17.

Granulomata.—Apart from an accident, such as was described resulting from necrosis of the thyroid cartilage, syphilis and tuberculosis *per se* are not specifically conducive to prolapse of the mucous membrane of the ventricle or to the development of growths within the ventricle. A well developed gumma limited to the ventricular band may cause confusion in the differentiation of the parts and in the diagnosis.

In tuberculosis of the larynx, a thickened infiltrated ventricular band beneath an intact resisting epithelium, but demarcated by a less resisting line of ulceration along the upper surface of the band, owing to the matting of the parts, might in the mirror be suggestive of a tuberculoma projecting from the mouth of the ventricle, the upper lip of which is suggested by the line of ulceration. Photographs illustrative of this condition when demonstrated made clear a point difficult to describe in bare text.

Lipomatosis.—Lastly an enlargement or tumefaction of the ventricular band, which at first might be attributed to one or other of the conditions referred to but due to a morbid change observed by the author some years ago, and hitherto, so far as he knows, not described. Post mortem and under the microscope the swelling was found to be due to a remarkable and circumscribed proliferation of fat cells amounting to a lipomatosis or fatty degeneration of the ventricular band. The condition is rare, but it is as well to bear in mind the possibility of this condition in cases presenting undue enlargement of the ventricular band without any adequate evidence of disease to account for it.

In conclusion prolapse of the ventricle of the larynx is not a traditional theory, it is an entity, and the tumours of the ventricle with which it has been confused are relatively rare.

DISCUSSION.

Dr. F. SPICER said he had now snipped a piece out of the tumour in the case he showed at the last meeting, and proved that it contained air, for the swelling collapsed entirely. The case would be shown later, after further operative treatment.

Dr. W. HILL exhibited by means of the epidiascope, sketches of the condition which he had observed in Dr. F. Spicer's case of laryngocele shown at the last meeting. He regarded the tumour as an enormously dilated sacculus laryngis which had herniated through the fibres of the anterior third of the right ventricular band, and which became inflated on coughing and forced expiration; when collapsed it could be seen in a crumpled-up condition lying on the ventricular band.

Epidiascopic Demonstration of Two Authenticated Specimens of Eversion of the Sacculus Laryngis.

By IRWIN MOORE, M.Ch.

(1) *From the Museum of Guy's Hospital*.—Recorded by Walter Moxon as eversion of the sacculus laryngis.

(2) *From the Museum of the Hospital for Diseases of the Throat, Golden Square*.—Recorded by Morell Mackenzie as eversion of the ventricle.

I am exhibiting these two rare specimens in connexion with the unique case shown at the last meeting by Dr. Frederick Spicer. I believe they are the only two post-mortem specimens of this condition in this country. I will first show slides of sections of the larynx to demonstrate the normal sacculus laryngis and the ventricle of Morgagni, because many people refer to them as one and the same thing.

The first specimen exhibited was shown at a meeting of the Pathological Society by Moxon in 1868. It was accidentally observed at the post-mortem on a male patient who died from cancer of the stomach. No laryngeal symptoms were present during life. A pendulous tumour, semi-elliptical in shape is seen protruding from the anterior half of the ventricular orifice and lying on the vocal cord. Moxon stated that this tumour could easily be replaced into the normal position of the sacculus laryngis, i.e., it could be inverted and returned behind the false vocal cord to again easily fall out of its position and reappear in the larynx as now seen. On these grounds he surmised that the tumour was the everted sacculus laryngis. Recent resection of a portion of the left thyroid ala by Professor Shattock has proved that Moxon was correct, for though half a century has elapsed since the specimen was placed in its receptacle—the everted sacculus can be easily replaced in its normal position and returned again to the position which it now occupies.

The second specimen now exhibited was recorded by Morell Mackenzie in 1871. It was also accidentally observed post mortem in a male patient, who, admitted to the Golden Square Hospital one evening, suffering from tuberculosis of the lungs and larynx, died next morning. Morell Mackenzie removed a portion of the thyroid ala and found that the sacculus laryngis was absent on the left side and that the protruded sac could be inverted and replaced in its normal position. He states that the "left ventricle of Morgagni" was entirely everted and the right sacculus protruded from the ventricular orifice. Recent examination of this specimen shows however that there is no prolapse of the ventricle and that the tumour consists of the everted sacculus laryngis. The latter can easily be replaced and a drawing (now exhibited) has been made showing the sacculus replaced in its normal position. The mucous membrane of the larynx in this specimen is seen to be involved by tubercular ulcers—most marked on the ventricular bands and cushion of the epiglottis.

It is necessary to discriminate between eversion of the sacculus laryngis and eversion of the ventricle. I hope, on a later occasion, to show proof for my belief that there is no such condition as prolapse of the ventricle of Morgagni and that the only way in which eversion of the ventricle can occur is either by a tumour occurring behind or in the wall of the ventricle pushing it or dragging it inwards into the cavity of the larynx, or as a secondary or final stage of eversion of the laryngeal sacculus. I am not able to support Dr. Hill's interpretation of Dr. Spicer's case.

I show an illustration of a case recorded by Fletcher Ingals which proved to be an eversion of the ventricle in a case where a large cyst occurred outside the ventricle and pushed the ventricle wall inwards, and presented in the larynx as a large tumour. The tumour was excised, cystic fluid escaped, and the greater part of the swelling disappeared leaving the ventricle everted, and, later, this was removed by means of a wire snare.

DISCUSSION.

Sir JAMES DUNDAS-GRANT was of the opinion that the appearance presented by Dr. Spicer's case, with such a history, could only have been produced by a lesion beneath the vocal cord. Trauma had probably occurred there, and air had been forced into the submucous tissue of the vocal cord and ventricular band. The swelling entirely collapsed when inspiration occurred, and with the production of an inspiratory voice, it could be seen to extend below the vocal cord. On expiration or attempted phonation, the swelling was at once produced and the voice disappeared. With regard to prolapse

of the larynx, about 1889 Gouguenheim read a paper in Paris on the subject, showing that most cases of so-called prolapse of the ventricle were tuberculous, an opinion which his (the speaker's) own experience had confirmed. Still, Dr. Irwin Moore had proved his specimens to be genuine eversion. Sir James asked whether the President had proved by microscopic examination that the tumours he referred to were not tuberculous.

Mr. JEFFERSON FAULDER said the specimen from Golden Square had been shown twice before as prolapse of the ventricle, and on neither of the occasions was there discussion on it. There was at the same hospital another specimen of the same kind. As to the causation of possible eversion of ventricle, other than pressure of a tumour, he suggested that chronic ulceration with infiltration as seen in the specimen under discussion, together with fibrosis and possibly cicatrization, might evert the healthy area of membrane between, as it did in polypoid disease of the rectum.

Sir STCLAIR THOMSON was pleased to note so much support for his statement that there was no such condition as prolapse of the ventricle, because the President's sections, unless they were dissected from outside, as Dr. Irwin Moore's had been, and unless microscopical sections were made, failed to demonstrate any actual prolapse of the ventricle. Koschier (of Vienna) made histological examinations in nineteen cases and demonstrated that there was no actual eversion of the sinus in any instance.¹ "Prolapse," such as occurred with the uterus or even the rectum, was anatomically impossible.

The PRESIDENT, replying to Sir J. Dundas-Grant, said the specimen he showed was not tuberculous. It was generally agreed that in using the term "ventricle" the sacculus laryngis was included; therefore it would be hair-splitting and a waste of time to argue that there could not be prolapse of the ventricle without prolapse of the sacculus. It was really comparable to the eversion of a finger-stall, the tip representing the apex of the ventricle or the sacculus; the apex reached the mouth of the ventricle first.

Adhesions between the Back of the Tongue and the Posterior Pharyngeal Wall.

By NORMAN PATTERSON, F.R.C.S.

MALE, aged 22, a bookbinder. Since 9 years of age has been treated for lupus, extending from the forehead on to the nose, which originated from a trauma. Two years ago first noticed dysphagia, unless food was carefully masticated. No pain. A year ago obstruction in the nasopharynx occurred. Tonsils and adenoids removed at 6 years of age. No history of exanthematous fevers.

Present condition: Dyspnoea on exertion. Dysphagia with hard foods. Oropharynx shows numerous bands of scar tissue, extending from the pharyngeal wall, border of soft palate and posterior pillars of the fauces, down to the base of the tongue, with small communications between the buccal cavity and the hypopharynx. Nasal cavity, except for deflected septum (to right), shows no abnormality. Wassermann negative.

Opinions are solicited as to treatment.

DISCUSSION.

Mr. F. ROSE considered there was a patch of active lupus in the palate, and that the disease had destroyed the epiglottis, with resulting adhesions. He suggested that the adhesions should be divided, followed by other active measures.

¹ *Wiener klin. Wochenschr.*, 1897, No. 37.

Sir J. DUNDAS-GRANT asked whether the mesial band, which seemed to be attached to the remains of the epiglottis, was attached to the posterior wall, or whether a bent probe could be passed behind it.

Mr. DOUGLAS HARMER said he had seen a lad, aged 17, with a very similar condition of the pharynx. Three months previously he had been operated upon for tonsils and adenoids, followed by scarring like that seen in this case, but without the mesial band. The scars had contracted so much that the patient was unable either to breathe or to swallow, and tracheotomy and gastrostomy had been performed. Division of the stricture first with the knife and then by diathermy (the whole ring being excised), improved the condition for some months, but the stricture gradually recurred in spite of dilatation, and ultimately it became so marked that only a small probe could be passed through it. There was no evidence either of tubercle or syphilis. Probably in such a condition there was some other infection similar to that which occurred in keloid.

Mr. G. W. DAWSON referred to two patients with adherent palate whom he showed two years ago, and who complained of increasing deafness and retained nasal secretion. Wassermann positive. In one of the cases previously operated upon the opening was not maintained. In both cases a dental plate, with a hollow prong protruding upwards into the nasopharynx, was employed with success.

Sir WILLIAM MILLIGAN agreed with Mr. Harmer that in this case there was something more present than the ravages of lupus—probably primarily obscured diphtheria, which, unrecognized, started the keloid process. He doubted if much could be done of a permanent character. He had in somewhat similar cases divided the adhesions with a knife or by diathermy, and employed a lead curtain suspended behind the palate. Improvement for some months followed, but the cases always relapsed.

Tumour of Nasopharynx Extending Outwards into Zygomatic and Temporal Fossæ (Section shown).

By NORMAN PATTERSON, F.R.C.S.

WOMAN, aged 64. March, 1920: Complained of pain in and discharge from nose, and deafness in right ear for seven days. Since a year old: Giddiness, progressively increasing swelling over right zygoma, gradual deafness, Headache.

On examination: Paralysis of right cord, right side of tongue, also partial paralysis of right side of face. Movement of right side of palate impaired. Right antrum opaque. Much mucus in right inferior meatus. There is a large firm tumour occupying the right half of the nasopharynx. Large tense swelling above right zygoma, not attached to skin, nor tender on pressure. Glands in right posterior triangle of neck. Some scarring of right membrana tympani. Wassermann negative.

X-rays suggest malignant bone changes in right maxilla.

January 17, 1920: Portion of tumour removed for microscopic examination. Radium inserted for thirty-six hours.

Reports of Two Cases of Fatal Tonsillectomy.

By A. L. MACLEOD, M.B.

Case I.—Girl, aged 10. Enlarged tonsils and adenoids. Operation at 9.15 a.m. Anaesthetic, C₁E₂. Seen at 12 and 2.30, quite well, no bleeding. Seen at 4.30, vomiting bright blood. Seen at 6, vomiting still going on. Blood clot in nasopharynx, none in tonsillar fossæ. Ether; stitched both

pillars—plug in nasopharynx, and $\frac{1}{8}$ gr. of morphia injected. Seen at 8 p.m., child warm, pulse improving, no bleeding. Again seen at 10, child better, conscious, talking and asking for food. At 3 a.m. sudden death. Nurse noticed twitching of face and limbs. Plug, which was firmly fixed in nasopharynx removed. Total bleeding following the operation not excessive. No post-mortem. Certificate signed "pulmonary embolism."

Case II.—Girl, aged 6. Enlarged tonsils and adenoids. Operation at school clinic at 10.30 a.m. Tonsils removed. Sluder's method. Adenoids removed by adenotome. Anæsthetic, C_1E_2 . Nothing noted. Seen 12.30: Hæmorrhage, vomiting; ordered adrenalin dropped in nose and morphia $\frac{1}{8}$ gr. Hæmorrhage continued. 1 p.m., second anæsthetic given. Clot in the left tonsillar fossa; left tonsillar pillars stitched; nasopharynx plugged. Patient did not recover consciousness; sudden death at 5 p.m. from no apparent cause. The plug was firm in the nasopharynx and there had been no further bleeding. Artificial respiration was performed for half an hour, along with ether and strychnine injections and massage of the heart. An inquest was held. On post-mortem examination, the tissues were blanched, but not excessively. Mucous membrane of stomach blood-stained but no clot present. The thymus was very slightly enlarged. The larynx was normal. No sign of clot or spasm. There were a few enlarged mesenteric glands. The other organs were all normal. The brain was not examined. Verdict returned: Death from hæmorrhage and shock.

The opinion of the members of the Section is desired on the following points: Was death caused by the anæsthetic, by embolism, or by laryngeal spasm? What part did the hæmorrhage play?

DISCUSSION.

Dr. DONELAN commended Dr. Macleod for his frankness in bringing these cases forward. He asked for further details of the operations, and whether all hæmorrhage had ceased before the patient was removed from the operating table. He also asked if the condition of the pulse had been noted, and other symptoms suggestive of internal hæmorrhage. In a great many of these cases, notwithstanding the prone position, the blood was swallowed, and those in charge of the patient were surprised when a large quantity of dark blood was vomited, followed by collapse.

Mr. W. STUART-LOW considered that it was much better to avoid giving a second anæsthetic in these cases of hæmorrhage, since it had the effect of raising the blood-pressure, and so keeping up the bleeding. In a few instances it was possible that the clotting power of the blood was at fault, and that a general oozing went on from all the vessels cut. In other cases large clots formed rapidly, acting as a poultice, and the bleeding went on underneath. When there was a clot present it ought to be thoroughly removed, and, if possible, the bleeding point picked up with forceps, which might be left in position for a time. He had found firm sponge pressure, continuously applied, the best method of treatment in recurrent hæmorrhage in preference to tonsil clamps.

Dr. P. WATSON-WILLIAMS thanked Dr. Macleod for having reported these cases; few members had not been faced with instances of unavoidable dangers and difficulties after operation for tonsils and adenoids. Dr. Macleod had not given a clear indication in his report of the amount of hæmorrhage, so that it was difficult to judge to what extent that might be an essential factor in the fatality. Was the nasopharynx plugged because the operator satisfied himself that it was the seat of the hæmorrhage? There were certain rare but possible factors difficult to eliminate, one of which might have been responsible in the first case. For instance, he remembered a small child at the Bristol Royal Infirmary from whom tonsils and adenoids were to be removed. The night before a violent hæmorrhage occurred, due to a gland, probably tuberculous, which had ulcerated into the carotid artery. If the contemplated operation had been per-

formed, the child's death might have been attributed to the operation. Was it possible that some such condition, or an aberrant vessel, existed in Dr. Macleod's case?

Dr. DAN MCKENZIE joined in commending Dr. Macleod for reporting these cases, which were so trying when encountered. Obviously the surgeon's duty was to assure himself that the bleeding had stopped before the patient left the table. Most cases of supposed reactionary hæmorrhage were not really such, but were instances of prolonged hæmorrhage. Often it was very difficult to locate the bleeding spot, but it was the surgeon's duty to do so. He asked what members thought as to the efficacy of stitching the pillars; it seemed to him to be a blind and uncertain means of controlling the hæmorrhage. In his opinion the bleeding point should be seized and a ligature applied.

Sir WILLIAM MILLIGAN did not feel convinced that hæmorrhage was the cause of death. He suggested the possibility that these children died of acute acidosis. He was aware that it was rare—he had experienced only one such case in his own practice. If hæmorrhage was the cause of death, was the hæmorrhage from some aberrant vessel, such as the ascending pharyngeal, which was opened at the operation but not observed? He took exception to what Mr. Stuart-Low said about disturbing a firm clot, as he regarded it as Nature's method of sealing and protecting the bleeding area. He would leave a firm clot alone.

Dr. LOGAN TURNER said that the statistics of the Edinburgh Infirmary on the points raised by Dr. Macleod during fourteen years showed that in 14,700 operations there were five deaths in children (one male and four females), all of whom were in-patients and had ethyl chloride anaesthesia. Their ages ranged from 7 months to 6 years, and death occurred fourteen hours, twenty-four hours, two days, three days, seven days after operation. In none was there any post-operative hæmorrhage. An autopsy was made in three of the five cases. The child who died in fourteen hours had a large thymus and mesenteric glands, probably the "status lymphaticus." The patient who died three days after operation had acute broncho-pneumonia. The third death was due to acute acidosis, which could follow ethyl chloride anaesthesia just as it could chloroform. He considered Dr. Macleod's second case died from hæmorrhage and shock. As to the clot, he agreed with Mr. Stuart-Low that when large clots formed in the tonsillar fossa it was best to remove them.

Dr. H. J. BANKS-DAVIS considered that in nearly all cases where hæmorrhage followed removal of the tonsil it came from the descending palatine branch of the inferior maxillary artery. When severed it retracted and was difficult to find, but it should be carefully sought for, clamped and ligatured. He referred to a female child, aged 8, who after enucleation of the tonsils had bleeding from three or four small spots, and not until he located this branch and clamped and tied it could he stop the hæmorrhage.

Mr. J. F. O'MALLEY said that he recently had a case in which considerable bleeding occurred, and he had to seize and clamp two bleeding points. On removing the forceps an hour later the bleeding recommenced, so he used a hæmostatic clamp. No hæmorrhage could be seen from the tonsillar region, but only a slight trickling of blood from the nasopharynx. As a result a quantity of blood was swallowed and vomited up. Post-nasal plugging controlled the bleeding. When difficulty was encountered in arresting bleeding more than one site should be examined.

Mr. E. D. DAVIS said most of the cases of hæmorrhage he had seen arose from the nasopharynx, and for that reason he plugged the nasopharynx immediately after removal of the adenoid growth, and removed the plug before the patient was returned to bed. Similarly, as soon as each tonsil was removed, he plugged the tonsillar fossæ with a captive swab and left it *in situ*. If on removal of the swabs the bleeding had not ceased he searched for a bleeding point which he clamped, and if insufficient, applied a ligature. By this means all bleeding was arrested before the patient left the operating table, and convalescence was quicker.

Dr. IRWIN MOORE regarded both these cases as instances of general oozing from the tonsillar fossa. When there was a bleeding point, even though hidden behind the

pillars, it was easy to locate it. In oozing from the tonsillar fossa it was common for a clot to form. He did not agree with Sir William Milligan that the clot should be left, for bleeding frequently occurred under the clot and trickled down into the stomach. The posture of the patient after operation had not been mentioned. He advocated ligature of the pillars in cases of general oozing, when a bleeding point could not be found and ligatured, and that the patient should leave the table with the tonsillar fossæ dry. Late primary hæmorrhage could occur, and was due either to slipping of a ligature, or to oozing.

Dr. DOUGLAS GUTHRIE advocated removal of a clot to make sure where the bleeding came from, followed by a tonsil clamp, which he left on for hours—in one case all night.

Mr. FRANKLIN said he thought the speakers who opposed each other in regard to the removal or non-removal of a clot in the tonsillar fossa were both right. If a fully organized clot existed one would obviously leave it. If it were not organized a continuous oozing from the deep surface of the clot would necessitate its removal.

Mr. G. W. DAWSON considered one-sixth of a grain of morphia a large dose for a child aged six years.

Dr. MACLEOD (in reply) said the operation was the ordinary Sluder operation. He always sponged out the tonsillar fossa before the child left the table, also was very particular about having the child prone, with the head on one side, so that any bleeding could be seen. In the first case the hæmorrhage did not commence until seven hours after the operation. It was not excessive in either case, but it was more profuse in the second, and when he examined the throat for the bleeding point, he could not find it, but only a general oozing. He plugged the nasopharynx in case the bleeding occurred from that site. He asked the opinion of members as to whether he had omitted anything he ought to have done.

Exhibit of Water-colour Drawings of Post-cricoid Carcinoma and other Conditions.

By A. LOGAN TURNER, M.D.

(1) POST-CRICOID carcinoma with secondary mediastinitis and pericæsoophageal abscess, in a female, aged 42.

(2) Sarcoma of larynx (extrinsic), in a male, aged 61.

(3) An unusual ulcero-membranous condition of the pharynx and upper aperture of the larynx, in a female, aged 65.

Full notes were attached to each exhibit.

Large Angioma of the Nasal Septum.

By HERBERT TILLEY, F.R.C.S.

FEMALE, aged 42, with swelling in right side of nose for eight months. Operation in May, 1920, followed by rapid recurrence and frequent nose bleeding. Seen by exhibitor on December 7, 1920, with large fungating, foul smelling mass projecting from right nostril, and semi-fluctuating swelling over right side of nose. December 16: Preliminary laryngotomy; incision within the mouth from right malar process to left canine fossa. Growth was found to be attached to septal cartilage by pedicle, the size of an ordinary lead pencil, with extension of growth upwards and backwards to ethmoidal region.

Pathologists are in doubt as to whether the growth is an angioma or melanotic sarcoma, but rather favour the first named.

(Patient and microscopic specimens were shown.)

DISCUSSION.

Mr. HERBERT TILLEY said he last saw the patient four weeks ago, when there was a clean perforation of the septum, which suggested a healing non-malignant growth. To-day there was a recurrence, therefore it was probably sarcoma. He proposed to operate again and irradiate the site from which the tumour grew. The growth removed was confined to the septum and growing from a fairly narrow pedicle, yet extension of the growth in the higher part of the nose had produced absorption of the nasal bone and much bulging of the soft parts over it, but since the operation a sinking in had occurred.

Dr. P. WATSON-WILLIAMS asked whether Mr. Tilley was sure the deeper ethmoidal region was free of growth. He recently had a case of similar appearance, which was a sarcoma of the septum, and a deeper growth involved the ethmoidal labyrinth. He did an extensive operation, but it was of no avail. Sarcomata in this part were apt to have widespread bases, and he advised early and very thorough removal of the growth.

Mr. O'MALLEY asked whether there was any connexion of the growth with the ethmoidal region, because this case appeared similar to one he had four years ago, in which a very extensive growth from the ethmoid region filled up the whole nasal cavity and pressed upon and deflected the septum.

Mr. TILLEY (in reply) said he was sure the ethmoidal region was not involved. If it had been involved there would not have been retraction of the skin since the operation. The posterior choana was clear, as also was the antrum on transillumination. The comparatively narrow pedicle arose from the septum, and there was retraction of the soft part after the operation, and hence one viewed these features as evidence of non-malignancy.

Tumour of the Larynx—a Soft Fibroma.

By W. H. JEWELL, O.B.E., M.D.

MALE, aged 57. Husky six months; five months ago coughed up piece of "flesh," size of hazel nut, giving relief for three weeks, but since then huskiness. Cough and impairment of breathing have been progressive. Feels growth moving about in his larynx. Unable to sleep on his right side. On tilting the head backwards, a smooth, succulent and somewhat globular tumour nearly the size of half a walnut is seen passing backwards from beneath the epiglottis and covering the whole of the glottis with the exception of a narrow space at the posterior extremity of the vocal cords.

DISCUSSION.

Dr. P. WATSON-WILLIAMS said that he had a similar case and considered it to be a soft fibroma. In the present case, despite the fact that the growth occupied the greater part of the glottic aperture, there was no urgent shortness of breath. He advised doing nothing unless difficulty in breathing occurred, when he suggested removal of the growth by suspension laryngoscopy.

Mr. JEWELL (in reply) considered that the small amount of respiratory distress in proportion to the large size of the tumour when patient was in the upright position was explained by the way he tilted his head forwards and downwards, so that the tumour fell forwards on to the base of the epiglottis allowing a comparatively free airway. He proposed to remove the tumour by laryngoscopy and laryngotomy, but if he found this impossible, owing to the patient having a short thick neck, or the attachment extensive, then he would perform a laryngo-fissure.

Foreign Body discharged from the Nose.

By CYRIL HORSFORD, F.R.C.S.

PATIENT suffers from chronic suppuration of the maxillary antrum, and has been twice operated upon. There is a good intranasal opening through which the antrum is regularly washed out, but discharge still continues. Following a few days' pain and irritation the foreign body now shown, which looks like a caterpillar, was blown out alive.

Postscript.—Mr. S. Hirst of the British Museum (Natural History), to whom I sent the specimen, reports that it is a centipede (*Lithobius melanops* Leach), and that seventeen cases have been reported in which such animals have been found in nasal cavities.

Bilateral Adductor Paralysis.

By PHILIP FRANKLIN, F.R.C.S.

MALE, aged 65, complains of hoarse voice, occasional paroxysms of coughing while eating or drinking. First noticed five years ago. No other symptom. Negative Wassermann. Report of post-nasal swab: *Staphylococcus aureus* and *Micrococcus catarrhalis*. Both vocal cords are bowed on expiration, with approximation of vocal processes and arytenoids.

DISCUSSION.

Dr. P. WATSON-WILLIAMS thought it was a case of paralysis of the thyro-arytenoids, with atrophy, and probably peripheral. He had seen it occur in association with bulbar nerve lesions, but this man had had it five years, and afforded no evidence of a central nerve lesion.

Mr. FRANKLIN (in reply) agreed with Dr. Watson-Williams as to the form of paralysis; he used the term "adductor paralysis," as he thought, quite correctly, realizing that the internal tensors were mainly involved. A possible nerve lesion had been excluded. It was probably not functional. He suggested that a nasopharyngeal infection might possibly be the cause.

A Laryngeal Growth with Abductor Paralysis.

By ELEANOR LOWRY, M.B.

PATIENT, a woman, aged 44, has complained of hoarseness, loss of weight, and occasional choking attacks at night during the last twelve months. She has always suffered from cough, and, for the last eight years, from asthma.

Present condition: Weight, 6 st. 11 oz. Considerable pulmonary tuberculosis, both lungs; no active signs; no tubercle bacilli. Thickening and granulations on right vocal process extending over posterior third of cord. Double abduction paresis (noticed last week only).

Is this a case of laryngeal tuberculosis, or a malignant growth? Is the paralysis due to the growth only?

DISCUSSION.

Mr. FRANKLIN considered it to tuberculous. The opposite cord seemed to be undergoing a similar and recent change, as there was an inflamed area posteriorly.

Dr. LOWRY agreed to bring the case again.

Postscript.—Wassermann reaction negative. Skiagram shows very extensive tuberculosis of both lungs with no definite sign of mediastinal growth. The left vocal cord has also become involved.

Section of Laryngology.¹

President—Dr. W. JOBSON HORNE.

Cystomata of the Larynx (Synopsis of an Epidiascopic Demonstration).

By W. JOBSON HORNE, M.D. (President).

UNDER the term "cystoma of the larynx" have been included conditions clinically alike but not pathologically akin. This explains the differences of opinions expressed as to relative frequency. Sir Morell Mackenzie regarded cystic tumours of the larynx as comparatively rare.² Of his 100 tabulated consecutive cases of growths in the larynx only two were regarded by him of the true cystic character. One of these appears to have been an eversion of the sacculus laryngis. Whereas Moure,³ quoted by Bosworth, regarded cystomata as the most common of all the benign growths in the larynx with the exception of papillomata.

The number of cases I have seen, and have been able to collate from the *Proceedings* of the Laryngological Society of London and of this Section, would not support the views held by either of these observers. The question therefore arises what may be regarded as *veritable cystomata* of the larynx and what conditions may simulate them.

True cysts of the larynx are *retention cysts* and *congenital cysts*. The former occur only in those parts of the larynx where epithelial glands are found. Hence retention cysts are more commonly found on the epiglottis and do not occur on that part of the vocal cord between the anterior and posterior vocal processes.

Congenital cysts are rarely seen inasmuch as they occur within the ventricle of the larynx, at the site of fusion of the epiglottis and thyroid portion with the remainder of the larynx; in the anterior part of the ventricle. At this site, close to the anterior commissure, the roof of the ventricle, i.e., the ventricular band, is thinned and through it a congenital cyst might herniate.

The conditions simulating cystomata, or *pseudo-cystomata* are polypi and growths that have undergone cystic degeneration; eversion of the sacculus laryngis—commonly called prolapse of the ventricle—and circumscribed œdema or bulla on the glottic aspect of the arytaenoid region, the result of localized inflammatory process.

Specimens illustrating these points were demonstrated.

DISCUSSION.

Dr. IRWIN MOORE demonstrated on the epidiascope a drawing of a cyst of the larynx accidentally found post mortem by Professor Shattock. It was situated on the right processus vocalis, and he remarked that cysts rarely occurred on the vocal cord itself.

¹ At a meeting of the Section, held March 4, 1921.

² "Diseases of the Throat and Nose," 1880, i, p. 312.

³ *Rev. mens. de Laryngol.*, 1881, i, p. 75 et seq.

He also showed drawings of other cysts of the larynx. In one case a cyst originated in the wall of the sacculus laryngis and caused eversion of the sacculus. In another case recently recorded by Cohen¹ (Cologne)—the cyst originated from the ventricle of Morgagni—the only one he (Cohen) had seen during twenty years. This observer had collected the statistics of all cases recorded to date which showed that 154 cysts of the larynx had been reported, of which only thirteen originated from the ventricle of Morgagni.

Mr. TILLEY referred to a large cyst illustrated in the last edition of his (the speaker's) book. That cyst nearly suffocated the patient on two occasions and at each crisis the patient put his finger down and ruptured the cyst, with relief lasting two or three weeks. When he first saw the patient he punctured the cyst, and took away most of its wall, thinking this would cure the trouble, but within a few weeks the cyst was as large as ever, and a swelling appeared on the front of the neck. Endo-laryngeal treatment having failed Mr. Trotter removed the cyst by external dissection up to its origin in the larynx and found that the laryngeal portion of the cyst was a portion of that which could be felt externally. It seemed clear, from this and Dr. Ingals's case, that some of these cysts only invaded the larynx by accident; and in removing them one must be prepared for an extensive external operation.

Sir WILLIAM MILLIGAN said he had seen two blood cysts on the vocal cords. The first in a professional singer who suddenly lost her voice during a concert and had to leave the platform. When he saw her next day, she had a small blood cyst on the vocal cord about the size of a pea. The second case occurred also in a lady singer who ruptured a vessel whilst singing. Both patients had high soprano voices. He had recently seen a cyst on the epiglottis in a male, aged 45, which he removed with forceps, followed by cauterization of its linear attachment. It produced a small scar on the epiglottis, but probably would not cause any inconvenience.

Mr. CYRIL HORSFORD mentioned a case similar to Mr. Tilley's in which after intralaryngeal methods had failed, Mr. Trotter removed the thyroid ala and excised the cyst. This cyst probably had an intralaryngeal origin, though it appeared to be in the neck.

Dr. DONELAN mentioned an interesting instance of multiple cysts of the larynx, which occurred in Sir Morell Mackenzie's practice in 1889, and consisted of three cysts fusiform in shape, situated on the epiglottis.

Dr. W. HILL regarded true intralaryngeal cysts as very rare. He had seen many, mostly on the anterior surface of the epiglottis; in one case two cysts of unequal size, the larger originating from the anterior surface. Those who said cysts of the larynx were common were really referring to cysts situated in the glosso-epiglottic fossa. He had also seen one large blood cyst in a man who was taken suddenly ill after a fall, and it was thought he would require tracheotomy during the night. Next day a large non-pulsating hæmatoma was observed. He inserted a lancet which relieved the distress, and it did not recur.

An Account of Two Cases of Obstruction of the Œsophagus by a Foreign Body acting as Ball-valve.

By SOMERVILLE HASTINGS, M.S.

Case I.—In May, 1908, E. C., a woman aged 30, was admitted to one of the medical wards of the Middlesex Hospital. She had borne five children, and in September, 1907, shortly before the birth of the last, after severe vomiting, she suddenly became unable to swallow anything either solid or fluid, and everything she tried to swallow returned. She complained of no pain, but of a heavy feeling between the shoulders. After a few days, some power of

¹ *Zeitschrift f. Laryngol. u. Rhinol.*, 1921, x, p. 41.

swallowing returned and she was able to take fluids. When admitted to hospital, she was extremely thin and was only able to take a certain amount of milk, a good deal of which was returned, together with most of the saliva which she had swallowed. No œsophagoscopy was carried out, but a bismuth meal showed a constriction of the œsophagus, a little above the level of the heart, with marked dilatation above it. A diagnosis of malignant stricture of the œsophagus was made, and when she left the hospital on June 5, the following note was written on her case sheet: "Patient has somewhat improved with the rest. She is now able to keep down milk and fluid substances. Patient has been recommended to go home and live on a fluid diet as long as she can, and then when she can no longer take this, to return and have a gastrostomy performed."

After her return home she remained in the same condition for about two years, after which her power of swallowing improved, and she was able to take a certain amount of semi-solid food if eaten slowly. Eight years ago, she suffered from a similar attack which improved after six weeks.

At the beginning of September, 1920, the trouble again recurred, and she presented herself for examination at the Middlesex Hospital on November 26, 1920. The œsophagoscope was passed and 11 in. from the incisor teeth a large cherry stone was found, resting like a ball-valve on a smooth fibrous stricture of the œsophagus, with a lumen not quite large enough to allow the cherry stone to pass. The œsophagus above this was much dilated. After the cherry stone had been removed the swallowing once more became normal, and when last seen on January 4, 1921, the patient stated she had put on weight and could eat anything, and felt better than she had ever done before in her life. She stated that she had eaten no cherries for the last twelve years. She would not permit another examination of the œsophagus.

Cherry stone exhibited for examination.

Case II.—On December 20, 1915, A. H., a woman, aged 52, was admitted to the Middlesex Hospital, and gave the following history: For several years she had had occasional difficulty in swallowing, which had always been relieved by manipulation of the neck. About mid-day on the day of admission, she was eating some Scotch broth with some rather hard peas in it, when sudden obstruction occurred and she was unable to swallow fluids or solids of any kind. Her temperature rose to 100° F. soon after admission to hospital, and she complained of slight pain on taking a deep breath. At 10 p.m. on the same day the œsophagoscope was passed and 8 in. from the upper incisor teeth the cause of the obstruction, a large hard pea, was seen. When this was removed by forceps the mucous membrane on which it was pressing, appeared sloughy, and a round constriction, not large enough to admit the pea, was seen. The patient was able to swallow fluids at once, the temperature fell to normal, and she left the hospital on December 23.

On January 4, 1916, she was seen as an out-patient and the large œsophagoscope tube was readily passed almost to the stomach, and no stricture seen.

On May 12, 1916, she again came to the hospital for treatment of chronic superficial glossitis, and stated she had had no further trouble in swallowing.

DISCUSSION.

Dr. HILL said he was puzzled by the second case of marked stricture, which spontaneously disappeared within a month. Was it an acute swelling, which subsequently subsided?

40 Dundas-Grant: *New Growth in the Left Bronchus*

Dr. DAN MCKENZIE referred to two cases he had reported in the *Journal of Laryngology* in which there was a stricture of the lower pharynx, or upper end of the oesophagus, 8 in. from the incisor teeth. Both patients had occasional attacks of complete obstruction; yet one passage of a bougie was sufficient to cure them, and he thought, in reply to Dr. Hill's question, that one of Mr. Hastings' cases was of the same nature as those he had described.

Mr. W. MOLLISON mentioned a similar case, in which a man was suddenly seized with inability to swallow. Mr. Mollison found a plum stone at the lower end of the oesophagus. Expecting to find it resting on a growth, he tried to remove it, but it easily passed through the cardia and the patient was cured.

Mr. SOMERVILLE HASTINGS (in reply) suggested that the presence of a foreign body acted as an irritant and kept up the fibrous stricture, which slowly disappeared after the foreign body was removed. The cherry stone appeared to have been in the oesophagus for over twelve years.

Case of New Growth in the Left Bronchus.

By Sir JAMES DUNDAS-GRANT, K.B.E., M.D.

W. W., A MIDDLE-AGED man, first seen in January, 1919, with cough and shortness of breath of twelve months' duration, with streaks of blood in expectoration for the last few days. He had been in a sanatorium from December, 1917, till February, 1918, and had wasted to a moderate degree. The dyspnoea was accompanied by stridor which was mainly inspiratory, though in part expiratory, and without excursion of the larynx or recession. Tubercle bacilli were never found. The larynx was normal in colour and movement, with nothing to produce stridor. The symptoms suggested pressure on the trachea, but direct examination by bronchoscopy revealed in the left bronchus a pale, flapping growth with indistinct fimbriation.

I removed the growth by lower bronchoscopy after tracheotomy. The breathing was at once easier and improved so much that the patient was soon discharged from the hospital, the tracheotomy wound having been allowed to close. The growth was by accident spoiled so that a microscopic examination could not be carried out.

The patient disappeared and no report could be obtained as to his further progress, and it was only in the middle of January of the present year that he returned with a statement that his breathing had been quite comfortable from the time of the operation until a few weeks ago.

On examination on January 25 the stridor appeared to be tracheal and he breathed better with the head bent forward. The larynx and upper part of the trachea appeared to be normal, and on direct bronchoscopy a smooth, rounded growth was seen in the left bronchus apparently growing from the outer wall. Endeavours were made to remove it with Killian's long forceps, but it eluded the grip and only a small fragment could be extracted. The bronchus appeared to be narrowed. It is proposed to carry out removal again after re-opening the trachea, but the patient's comfort has increased so much that he is disinclined for further operation at the moment.

In 1919 the X-ray examination revealed: "Heavy root shadows and enlargement of the posterior mediastinal glands: *nil* in aorta; no mediastinal neoplasm; heart narrow, vertical in position. Want of translucency at both apices; no oesophageal obstruction."

On February 3 of the present year: "Shadows at the hila very heavy and woolly; lungs translucent: no evidence of deficiency of the air entry seen."

DISCUSSION.

Dr. W. HILL remarked that secondary growths in the left bronchus in connexion with carcinoma of the oesophagus were commonly seen; he demonstrated one on the previous day. He had seen one case of primary carcinoma of the right bronchus, which when touched bled profusely. Following the application of a large quantity of radium at the Radium Institute, the man temporarily improved in spite of extensive radium burning of skin. On account of the hæmoptysis the case had been diagnosed as phthisis, though no tubercle bacilli had been found.

Dr. KELSON asked whether the growth was connected with the thyroid. Some tracheal growths were occasionally connected with that gland.

Mr. SOMERVILLE HASTINGS asked whether the small piece removed was microscoped, and if so with what result.

Sir JAMES DUNDAS-GRANT (in reply) said the growth was so far below the level of the thyroid that there was no connexion with that gland. The right bronchus could not be seen, as there was displacement, and the X-ray picture threw but little light on the cause. The piece removed was not large enough to be sectioned for the microscope. There was no history of syphilis, but the Wassermann reaction was positive.

Case of Fixation of Vocal Cord following Healed Tuberculosis of the Larynx.

By Sir JAMES DUNDAS-GRANT, K.B.E., M.D.

H. S., A MIDDLE-AGED man, first seen in April, 1919, when there was extensive infiltration of the left ventricular band and aryepiglottic fold and a triangular area of ulceration along the posterior half of the edge of the right vocal cord. The following week the aryepiglottic swelling was punctured by the galvano-cautery, and a fortnight later the left ventricular band.

On August 4, 1920, there was a pale, shiny infiltration of the right vocal cord and redness of the posterior two-thirds of the left one with superficial ulceration on the vocal process. On this occasion the feeling was one of swelling in the throat, and the pharyngeal reflex was found to be distinctly diminished, while at the same time there was comparative insensibility of the right conjunctiva, as shown by the absence of palpebral reflex on touching the conjunctiva. The patient had gone through a period of extreme anxiety, and the disordered sensation was a paræsthesia and not fresh exacerbation of the tuberculosis.

On January 25 of the present year there was almost complete fixation of the left vocal cord without any material infiltration of the aryepiglottic fold. The immobility is probably mechanical and caused by cicatricial changes following tuberculosis.

The probability of the fixation being due to the galvano-cautery puncture is small in view of the fact that there was apparent mobility when he was examined in August, 1920.

Case of Chronic Suppuration of the Antrum of Highmore treated by the Canfield Operation. (Previously exhibited.)

By Sir JAMES DUNDAS-GRANT, K.B.E., M.D.

PATIENT, a female, aged 18, had suffered from discharge from left nasal cavity for three years. Treatment by irrigation had been without effect.

DISCUSSION.

Sir JAMES DUNDAS-GRANT said the Canfield operation consisted in making an opening into the antrum through the edge of the pyriform fossa, by an incision inside the nose, and detaching the periosteum outwards and inwards. One opened straight into the antrum. On the previous occasion a plastic flap was made by detaching muco-periosteum from the outer wall of the inferior meatus and the under and outer surfaces of the inferior turbinal, cutting it off from there and pushing this flap of mucous membrane into the opening made into the antrum. Even if this "plastic" was imperfect this procedure gave better results than he had obtained by the other methods described, especially in regard to rapid drying up of the discharge.

Dr. W. HILL did not see in what respects this operation was preferable to the canine fossa route, though perhaps preferable to the Denker route. After trying various nasal routes he had gone back to the old canine fossa operation.

Mr. SOMERVILLE HASTINGS said he had several times performed a similar operation, but without using any mucous membrane flap. The results had been so good that he failed to see the advantage of the mucous membrane flap. He never interfered with the mucous lining of the antrum if it could possibly be avoided; if this was left alone only the thin cut edge of the antranasal septum was uncovered by mucous membrane.

Mr. STUART-LOW remarked that he could still detect whitish-yellow accumulations, and he doubted, therefore, if this method of operating had resulted in complete removal of all the diseased lining of the antrum, so essential in all chronic cases. He considered this way of operating more applicable to sub-acute cases, as it seemed impossible to get away all the thickened pyogenic membrane or polypoid lining through such a small opening. He much preferred the canine fossa route, as everything could be so easily seen and removed, even up into the malar and lacrymal recesses.

Sir WILLIAM MILLIGAN asked what was the after-history of these cases. The objection to this operation was that the opening must be comparatively small, and he wondered whether it maintained sufficient drainage. He would have thought it an excellent operation for sub-acute cases, but not for really chronic cases with definite disease in the mucous membrane. The one or two cases on which he had performed it were sub-acute.

Mr. LAWSON WHALE said one great advantage of the Canfield operation was that the operator could see directly into the cavity of the antrum better than by any other method. After-treatment, such as the removal of polypi, was also facilitated.

Mr. MARK HOVELL said he strongly recommended the canine fossa route followed by a free opening through the intranasal wall, and closing the opening in the canine fossa at the completion of the operation.

Mr. J. F. O'MALLEY asked if the exhibitor had ascertained whether the infection was intranasal or dental in origin.

Dr. DAN MCKENZIE said he had shown, years ago, a case of Denker's operation, but he had not repeated the procedure because two or three members who had tried it found a tendency for the ala to sink into the opening which had been made. He did not agree with removing the lining membrane of the sinus. When the sphenoidal sinus was opened it was allowed to drain, without disturbing the lining. Why, then, was it necessary to remove the lining of the antrum? If sinuses were opened so that they were well ventilated the disease could be left to Nature.

Dr. DONELAN agreed with Dr. McKenzie that it was not necessary to remove the pyogenic membrane if a sufficiently large antranasal opening were made. In the year 1909 he demonstrated to the Section a modification of the Mikulicz antranasal operation and showed a special form of perforator and rectangular chisels with which it was possible to remove enough of the antranasal wall in less than half a minute to permit of thorough examination of the antrum and even digital exploration in patients with large vestibules. He thought the antranasal opening should in every case be made first because it was rarely necessary to proceed to the canine operation. In his experience it was only needed in about 4 per cent. of cases.

Mr. JEFFERSON FAULDER asked whether the nasal duct was ever constricted as a result of this operation; it had been said in the Section that stricture of the duct sometimes followed this kind of operation on the antrum. There was a further disadvantage in removing the pyogenic membrane, apart from the prolonged discharge mentioned by other speakers, for he had had to operate again two or three times and found the cavity filled with soft bone, with interspaces containing pus. He did not think new bone developed if the lining of the antrum was preserved.

The PRESIDENT was not in favour of intranasal operations for the radical treatment of chronic suppuration of the antrum of Highmore. The operation through the canine fossa with a counter opening through the outer wall of the nose had given him such good results that he did not feel justified in abandoning it in favour of intranasal operations which had not stood the test of years.

Sir JAMES DUNDAS-GRANT (in reply) said the formation of a flap helped to maintain the opening longer. This case had been suppurating three years, and there had been weekly washings out for a couple of months, without cessation of the discharge, but almost immediately after this operation the discharge ceased completely. The infection was apparently nasal in origin, probably caused by influenza. He had not again seen the cases in which he did the operation two or three years ago, and he thought he would have done so if anything had gone wrong with them. Mr. Whale had well expressed the advantages of this route; the canine fossa route involved more laceration. It was agreed that the lining membrane of the antrum must be dealt with tenderly. A pyogenic membrane might recover and become good again; but there were cases in which there were polypi, and they must be removed. He did not think the bone should be scraped bare unless the cavity was going to be obliterated, which could be effected, but that was only rarely necessary. Dr. Donelan used ingenious instruments, but they were more liable to damage the nasal duct than is the operation described. In the case of the present patient there was no disfigurement. With regard to opening the angle, it was a sort of "forecastle" in the cavity, which was difficult to clear by an opening through the canine fossa, and still more through the inferior meatus of the nose. He would submit any further cases in which he did this operation.

Bilateral Paralysis of the Internal Tensors of the Larynx.

By PHILIP FRANKLIN, F.R.C.S.

PATIENT, a girl, aged 12. Loss of voice for six months; onset sudden.

Past history: Several attacks of aphonia lasting a few days, since the age of 4.

On expiration the arytenoids meet, the cords being bowed. The mucosa of the nose and pharynx is atrophied.

Is this functional, or due to a nasal or post-nasal infection?

DISCUSSION.

Mr. HORSFORD said he thought the case corresponded with one of involvement of the superior laryngeal nerve; the arytenoid was paralysed, also the internal tensors, which were partly supplied by that nerve. There also appeared to be loss of sensibility, because when swallowing liquids they seemed to pass into the larynx, and this was another symptom of superior laryngeal nerve paralysis.

Dr. DONELAN did not think there was paralysis, but that there was wasting of the internal tensors, such as was seen in old people, producing the quavering voice of age. There may have been myositis, due to overfunctioning. He had a similar case in a member of a choir, who had been singing under all sorts of conditions all his life, and probably the muscles had given out at last.

Dr. KELSON did not think the case could be described as one of adductor paralysis. The lateralis was acting, but the arytenoideus and the internal tensors were not acting.

Mr. LAWSON WHALE suggested there was posticus paralysis in addition to tensor paralysis: he noticed a triangular opening between the arytenoids.

**Notes of a Case of Pharyngeal Pouch removed from a
Male, aged 72, Seven Years ago.**

By W. H. KELSON, M.D.

PATIENT, a man aged 78, had a large pharyngeal pouch removed by exhibitor seven years ago.¹ Complete relief of all symptoms followed and he had not been seen again since then until February of the present year when he came complaining of slight difficulty in swallowing, but there was no



FIG. 1 (1914).



FIG. 2 (1921).

regurgitation of food. Esophagoscopy showed marked dilatation at the site of the former pouch and at the bottom of this there was annular constriction. No ulceration is to be seen nor enlarged glands to be felt. He states that he has lost weight considerably lately.

Two bismuth radiograms (figs. 1, 2) are exhibited, one taken in 1914 showing the pouch; the other a fortnight ago showing present condition. It has been suggested that the last skiagram indicates the presence of malignant disease. The dilatation is now irregular and not pouch-like.

¹ Vide *Journ. Laryngol.*, November, 1919, p. 448 (Case II).

*Report on Skiagram (fig. 2), by Mr. Martin Berry (February 22, 1921).—*There is an obstruction high up the œsophagus which in its general appearance suggests new growth. The plate shows a mass of bismuth the upper level of which is at the seventh cervical vertebra, and therefore entirely below the pharynx. The œsophagus in this region is dilated, the greatest width of the shadow being nearly 2 in.; the posterior wall of this portion shows some bulging backwards. Below this dilated portion is a narrow shadow caused by the bismuth trickling through the obstruction. This narrow portion commences at about the level of the second dorsal vertebra and extends downwards, as judged by its shadow, for nearly 2 in.; its margins are irregular. In the dilated portion of the œsophagus there is a constriction, the edges of which are quite clearly defined; it is possible that this is due to cicatricial tissue at the site of the operation.

Postscript.—Patient died April, 1921, a month after gastrostomy. Carcinoma was found post mortem at the seat of the former pouch. The specimen is in the Museum of the Royal College of Surgeons.

Case of Left-sided Glosso-palato-vagal Paresis.

By W. M. MOLLISON, M.Ch.

PATIENT, a female, aged 35, when seen on February 5, complained of swelling of the glands in the suboccipital region, aching of the throat and loss of voice for two days only; she stated she could shout three days ago. She had some vertical and occipital headache, and an occasional burning sensation in the tongue. The glands in the suboccipital region were not at all definite, and may have been small nodules in the attachments of the muscles to the superior curved line. It was noticed that the tongue was protruded towards the left side and the left side was less resistant. The soft palate was drawn up to the right side on phonation. The left vocal cord was stationary.

Dr. Symonds saw the case and found that the trapezius and sternomastoid on the left side were weak. He diagnosed the case as one of Tapia's syndrome.

The Wassermann reaction is negative.

Case of Lingual Thyroid.

By GEORGE BADGEROW, C.M.G., F.R.C.S.Ed.

PATIENT, a female, aged 25, complains of nasal catarrh. On examination a tumour is seen at the base of the tongue, which causes no difficulty in swallowing or breathing, nor is speech interfered with in any way.

Patient claims to have a good voice, which ranges from soprano to contralto, and then to mule quality baritone.

DISCUSSION.

Mr. HOWARTH said that some years ago he brought three similar cases before the Section. These conditions did not usually cause trouble, and were often discovered accidentally. If they did cause trouble, the question arose as to what should be done, and as to whether the patient had enough thyroid tissue to go on with. In two cases he had to operate because of intense dyspnoea, and at the operation he took the opportunity of seeing whether there was any thyroid gland in the neck. In one case there was some glandular tissue on one lateral lobe, and in the other case a portion of the

isthmus was present. So he could safely do the operation, and the patients had no further symptoms. If one found there was not enough thyroid tissue in the neck nothing more should be done than to remove the projecting portion of the lingual swelling with the galvano-cautery. A good many cases had been reported, and in looking up the literature he had found ninety-five cases recorded to 1910. As there were no symptoms in this case he did not think interference was advisable.

Mr. W. STUART-LOW said that he had repeatedly shown a typical case of this kind: a young woman, who complained of difficulty in swallowing and singing, and in whom a large swelling was easily visible at the posterior third of the tongue, which turned out to be an enlarged and aberrant thyroid. He found that there was no mention in the literature of such tumours of the method he had first successfully adopted in this instance—viz., splitting the tongue in the middle line right back on to the enlargement, and then, with a ligature in each half of the tongue and pulling outwards laterally, the tumour was easily shelled out from its site. The tongue was then sutured, and healing took place by first intention, no myxoedema even developing, although it had been suggested that this might occur.

Mr. GEORGE BADGEROW (in reply) said he showed a similar case about seven years ago, in which he removed the tumour by enucleation, but the bleeding was so free that he did not propose to do it again. He also had another case in which he removed the tumour after splitting the tongue, and was able to control the hemorrhage much better. As the present patient did not complain of symptoms, he did not propose to do anything operatively.

Bilateral Abductor Paresis of Cords with Simple Enlargement of Thyroid.

By C. F. BEEVOR, M.B.

PATIENT, a male, aged 16, first noticed the breathing became noisy in September, 1920. Saw his doctor in December, who removed adenoids. In January, 1921, noticed swelling in neck. There is soft regular enlargement of thyroid, both lobes and isthmus being affected. Examination of larynx shows partial bilateral abductor paresis of cords. Remains of carious right lower molar with commencing alveolar abscess were removed on February 25. Patient can lie down in bed comfortably, stridor can always be heard but is much more marked on exertion. For extraction of tooth chloroform was given without difficulty.

DISCUSSION.

Dr. SMALLEY said there was also slight adductor paresis. Probably the boy would get complete paralysis. He had never seen a case of complete paralysis which was due to simple parenchymatous enlargement. He suggested that ordinary medicinal treatment should first be tried.

Mr. LAWSON WHALE pointed out that the stridor in this case was both inspiratory and expiratory, and possibly might be of mixed origin. The paresis of the cords and inequality of pupils might be due to trouble in connexion with the recurrent laryngeal nerve and sympathetic; but as the stridor was of the double form, there might also be direct pressure on the trachea.

Mr. BEEVOR (in reply) said he brought the case because he thought it was very uncommon to see a soft enlargement of the thyroid involving both recurrent laryngeal nerves. Mr. Trotter saw the case, and said he was familiar with unilateral involvement, but he did not seem to have seen a bilateral case. He wished to show the case before treatment was begun, and he would like to show it again later, and report what had happened. Sir James Dundas-Grant said he thought the trachea was involved in the pressure, and that it was necessary to do something operative. The patient was in hospital, so that if tracheotomy or other urgent measure should be required, it could be done quickly.

Section of Laryngology.¹

President—Dr. W. JOBSON HORNE.

Some Contemporary Notes of a Case of Pharyngeal Pouch— first reported 1764. Epidiascopic Demonstration.²

By ARCHER RYLAND, F.R.C.S.Ed.

DIAGRAMS illustrating the pouch were exhibited, and the speaker referred to points of interest in the case as follows:—

First, the case was recorded very fully and very candidly and was followed through to a careful post-mortem examination.

Secondly, in the origin of the abnormality, there was a close association with the impaction of a foreign body, so that they had in this case, beyond all reasonable doubt, definite knowledge of the origin of the pouch.

Thirdly, they had here an account nearly a hundred and sixty years old of the typical history and symptoms of a class of case which, comparatively speaking, had prominently engaged their attention only within recent years.

DISCUSSION.

Lieutenant-Colonel A. MYERS said the subject was of particular interest to him since he himself had a large pharyngeal pouch, of, he believed, the same nature as that now depicted. In past years he had suffered a good deal from stomach trouble, and Sir William Broadbent advised him to use a stomach tube for lavage, which he did once or twice a day. He thought that the passage of the tube caused a slight dilatation of the œsophagus, which subsequently increased. His condition was now a very uncomfortable one, for he ejected from one-third to two-thirds of every meal.

Dr. W. HILL said some confirmation was needed of the so-called pouch being made up of the muscular walls. If it had walls it was not the conventional diverticulum of the pharynx which members knew, in which there was never any muscular wall. That was shown by Denker many years ago, after an examination of all the specimens he could find in the museums of Europe. If this case now demonstrated was not a pouch, but merely a pouching, then the whole thing was explained. Assuming that the inferior constrictor formed a wall to this pouching, it was not a diverticulum, but a dilated gullet. He thought Mr. Ryland was too ready to believe this condition was due to a foreign body having become impacted. He (Dr. Hill) had often seen a foreign body impacted in a dilatation of the œsophagus, but the stricture had been there before, and as the stricture gradually became smaller the foreign bodies passing had been held up. In this case he thought it likely that there was a narrow stricture at the mouth of the œsophagus, and that the foreign body was only an incident in the case, one which served to show that a dilatation existed. It was only in cases of dilatation of the whole of the lower pharynx that muscle was a constituent, and an instance of that could be seen in the College of Surgeons Museum.

¹ At a meeting of the Section, held April 1, 1921.

² "MEDICAL OBSERVATIONS AND INQUIRIES."

By a Society of Physicians in London, 1769, vol. iii.

"A Case of Obstructed Deglutition from a Preternatural Bag formed in the Pharynx.—Reported in a letter from Mr. Ludlow, Surgeon in Bristol, to Dr. William Hunter, 1764. Male, aged 60. Inability to pass food into the stomach. Five years after swallowing a cherry-stone.

"It was clear that the bag was formed of a dilatation of the entire substance of the posterior part of the pharynx, the uniformity and thickness of both being so exact that it was impossible to ascertain at what particular point the dilatation first began."

Mr. RYLAND (in reply) said that Dr. Hill was in all probability right in his remarks with regard to the constituents of the pouch wall. The original author, however, as the notes showed, had been very emphatic in his statement that the wall of the pouch contained all of the constituents of the pharyngeal wall, and there was no doubt that the pouch had been carefully examined post-mortem in order to determine this point. It could not be supposed that powers of pathological observation were so accurate in the middle of the eighteenth century as they were to-day.

Case of Lateral Proboscis.

By PHILIP FRANKLIN, F.R.C.S.

THE name "demicyclops" is suggested by Professor Arthur Keith as a more satisfactory nomenclature. This condition is due to an early fusion of the maxillary process to the exclusion of the mesial and lateral nasal processes of the affected side. This accounts for the absence of a premaxillary bone, which develops from the mesial nasal process. In order to picture this abnormal condition, imagine a developmental failure of the fronto-nasal process, with a fusion of both maxillary processes, and disappearance of the nasal fossa and accessory sinuses, giving rise to the appearance of an eye with an appendage termed a nasal proboscis or tube, resembling a penis in form. The central canal of this appendage can be traced to the depth of the orbital cavity.

In a true cyclops the orbital and nasal cavities, the eye and optic nerve are fused into one. The nasal proboscis is situated above the eye. In the condition of demicyclops the fusion is unilateral. Selenkoff describes a post-mortem examination of a case of proboscis lateralis (see "Schwalbe's Morphologie," p. 194, fig. 125). The left naris is normal; both cerebral hemispheres are fully developed. The right olfactory bulb is rudimentary; right ethmoid and lamina cribrosa are undeveloped. All the other bones of the basis cranii are normal. The right nasal bone is missing, but there is compensatory overgrowth of the processus nasalis of the superior maxilla of the same side. The puncta lacrymalis and lacrymal canal are missing, and the lacrymal sac is blind.

The interesting feature of this report is the condition of the cerebral hemispheres, and the undeveloped condition of the lacrymal apparatus.

The report of Kirchmayer's case, given in Schwalbe's "Morphologie," also recorded in Keith's "Human Embryology," is accompanied by description of a microscopic section of the appendage, as follows: "A tube lined by cylindrical epithelium, containing racemose glands. The appendage is covered by skin, adipose tissue, loose connective tissue, containing vessels and striped muscle fibres." Note the movement of the appendage in this case. The secretion has been described differently as salty, mucous, or as sebaceous material. In this case the secretion will be examined, to ascertain whether it is nasal, lacrymal, or cerebro-spinal.

The appendage is regarded as consisting of the soft parts of the nose, the hard parts being undeveloped.

The interesting features of the case are the facts that the child is alive, and that it is a male. The condition generally occurs in the female. The absence of the premaxilla will lead to the canine teeth taking the position of the central incisors. Movement of the appendage is quite apparent, and this suggests that the facio-nasal muscles are developed. The free extremity of the appendage, except for the perforation, shows the septum of the nasal vestibule, which at times causes occlusion of the anterior nares.

It is obvious that the appendage must be removed.

Professor Keith—to whom I am indebted for the loan of the specimens shown here to-day—when discussing the case with me, suggested that the eye should be removed at the same time in order to avoid the formation of a fistula and also subsequent lacrymation. A fistula is particularly to be avoided, since it may lead to subsequent meningeal infection. The appendage extends to the region of the cribriform plate and olfactory lobe. No trace of the olfactory nerve was discovered in three cases which were examined by Menard and Lannelongue.



DISCUSSION.

Mr. HOPE said he had suggested to Mr. Franklin the importance of an examination of the fluid coming from the proboscis, because, apparently, there was a close connexion at the base with the cribriform plate.

Mr. PHILIP FRANKLIN (in reply) said the mother evidently found the child a burden. He intended to procure a more satisfactory photograph. His attempts at obtaining a skiagram had not been successful. The nature of the fluid secretion would be tested. He would keep the child under observation as long as possible, and hoped to exhibit it again at the Summer Meeting of the Section.

Large Dental Cyst.

By G. W. DAWSON, F.R.C.S.I.

WOMAN, aged 44. Has had a painless hard swelling in left cheek for twenty-five years. During this time she has never been robust, suffering from neuritis in different parts of the body and occipital pain.

When she was first seen in December, 1920, left cheek was occupied by large hard swelling, slightly tender. Floor of left nostril was bulged upwards, and on transillumination left side was very dark. Cyst was found full of thick purulent material. It extended backwards into zygomatic fossa. When seized with forceps lining membrane peeled off quite easily in one piece. Entire outer wall, which was very thin, was removed.

50 Dawson: *Retention Cyst of the Floor of Left Nostril*

DISCUSSION.

Mr. STUART-LOW said he had had a good number of these cases to deal with, and his chief object and anxiety had always been to get the cavity closed. He deprecated packing; the fluid and food from the mouth would not go far up the cavity, and even if it did it would come down again. Neither should syringing be done. If the opening was swabbed out with a solution of chloride of zinc—20 to 40 gr. strength—closure would occur in a few weeks.

Dr. DAN MCKENZIE had found it impossible to close the cavity in some of these cases. He referred to an article in the *Journal of Laryngology*¹ last year dealing with closure by a plastic flap taken from the inner surface of the cheek. If Mr. Dawson decided to do this, it would be well to make a communication between the present cavity and the antrum, so that, should the cavity continue to drain, it would do so through the nose.

Mr. J. F. O'MALLEY said that unless a plastic graft such as Dr. McKenzie mentioned was used, the cavity would remain open, whether packing was done or not. In one or two instances in which he had found a particularly large cavity, instead of adopting exteriorization of the cyst he had made an opening below the alveolus, and cleared out the lining in that way. An obturator put into the mouth was more satisfactory than any type of process which could be attached to a dental plate to cover the opening above the jaw.

Mr. DAWSON (in reply) said he showed the case because of the long history (twenty-five years) and the large size of the cyst; it extended back into the zygomatic fossa and seemed to have entirely obliterated the cavity of the antrum. It was now closing up rapidly. In such a case Mr. Turner usually put in an obturator which closed up the opening. He would try leaving out the packing, and if that did not answer, he would carry out Dr. McKenzie's suggestion.

Retention Cyst of the Floor of Left Nostril, with Specimen of a similar Cyst removed last year from the Right Nostril of the same Patient.

By G. W. DAWSON, F.R.C.S.I.

THIS girl, aged 23, was shown at a meeting of the Section² last year for a similar condition of right nostril. Lip was turned up and the pale, almost white, capsule was immediately seen—it was wedged in between bony walls of nostril, and was therefore elongated in shape. It was easily separated from floor of nostril, and had no connexion whatever save a small point of mucous membrane above, which it separated widely from bony floor of nostril.

Cyst seen in left nostril is a pale non-tense swelling, which can be felt by finger under lip; it has not yet reached the dimensions of the removed cyst, which completely blocked up nostril and caused a prominence of the upper lip and right ala.

Patient complains of pain in left side of head and aching of bridge of nose.

DISCUSSION.

Mr. STUART-LOW regarded it as a dermoid cyst, and thought that the cyst on the other side was of the same nature. He suggested that sections should be made of the specimen already removed from the right side.

¹ *Journ. Laryng., Rhin. and Otol.*, 1920, xxxv, pp. 87-88.

² *Proceedings*, 1920, xiii, p. 122.

Mr. DAWSON (in reply) said that in some text-books retention cysts were not recognized. Dr. Brown Kelly, a great authority on these conditions, saw the cyst which was removed last year and agreed it was a retention cyst. The one now developing was not nearly as large as the former. He (Mr. Dawson) proposed to remove the present cyst by the same method. It was not likely there would be two dermoids, one on each side. When he turned up the lip in the previous case, the cyst immediately came into view, and he pushed it off the floor of the nose, without having to separate it; he found it attached by a small margin to the floor of the mucous membrane of the nostril. He would have the cyst in the present case examined after removal. Dr. Brown Kelly had pointed out that the reason these cysts originated only from the anterior portion of the nose was, that very large glands developed there, and not further back. He did not think more than twenty cases had been recorded, and as far as he knew this was the only double cyst on record.

Tumour growing from Right Supra-tonsillar Fossa Region.

By CHARLES W. M. HOPE, F.R.C.S.

A FEMALE, aged 50. The tumour has existed as long as she can remember. For diagnosis.

DISCUSSION.

Sir STCLAIR THOMSON said he showed a similar case many years ago, and a number of surmises were expressed in regard to it; it was pictured in his text-book.¹ He removed it with the whole tonsil, and the report was that it was simple tonsillar, lymphatic tissue; not a tumour, but an abnormal growth of the tonsil itself.

Dr. SYME remarked that he had seen a similar case, and it consisted only of tonsillar tissue.

Mr. STUART-LOW said he showed two similar cases at one meeting, and they turned out to be supernumerary tonsils.

Dr. W. HILL remarked that these were not supernumerary tonsils, because they were part of a single faucial tonsil; they came from the tonsillar fossa, not from the supra-tonsillar fossa. The condition was in the crypta magna. There were fringes inside, and they were very much like a knob of lymphatic tissue. He thought all the cases had been found to consist of pure lymphatic tissue. It would be interesting to know whether they had any arrangement similar to that in the normal tonsil, various follicles with trabeculae in between.

Mr. HOPE (in reply) said he intended to remove the tumour with the tonsil, if possible, and would have a report made, and presented. He suspected it was only an exuberant portion of the tonsil.

Scarlatinal Scarring of the Pharynx.

By DAN MCKENZIE, M.D.

PATIENT, a middle-aged woman. Having discovered a "lump" in her throat a few weeks ago, she came to hospital, and on examination it was seen that the lump was probably the uvula shifted over to right side of palate by old cicatricial contraction. The scarring with its fine edges, thin substance, and smooth surface, is unlike an old tertiary lesion, and the Wassermann reaction is negative.

Patient cannot remember ever having suffered from severe sore throats or ulceration, and she has never had a throat operation. But when 5 years old

¹ "Diseases of Nose and Throat," 1st ed., 1911, fig. 201, p. 416.

she was "very ill" with scarlet fever, and present condition of pharynx is most easily accounted for by assuming that there was at that time serious ulceration such as is occasionally seen in scarlatinal angina.

Mr. STUART-LOW said the swelling felt firm, and it could be traced back to the tonsillar fossa. He thought there was also a supernumerary tonsil present.

Case of Bilateral Abductor Paresis of Vocal Cords.

By MICHAEL VLASTO, F.R.C.S.

G. H. C., AGED 64, porter, married, no children, has suffered from difficulty in breathing and hoarseness for the past twenty years. He came under the care of Dr. Hood, of the Marylebone Infirmary, seven years ago, by whom he was sent to hospital for advice. In 1916 his respiratory distress became acute and he was admitted to Golden Square. Unfortunately, no record of the case can be traced. His Wassermann reaction apparently must have been positive as he was again admitted a little later on for a course of injections. His voice and breathing improved until three months ago when he had a feverish attack, and from that time his symptoms have gradually become worse.

Present condition: Inspiratory stridor, breathlessness on exertion. Vocal cords show very little inspiratory excursion. Arytenoid cartilages are mobile to the probe. X-ray of chest negative. Dr. Gordon Holmes reports no physical signs in the chest and central nervous system normal.

The case is shown for diagnosis and suggestions as to treatment.

DISCUSSION.

Mr. G. W. DAWSON said it would be interesting to know whether members advised tracheotomy in this case; it was the usual practice.

The PRESIDENT said the question raised by Mr. Dawson as to tracheotomy was all-important.

Sir STCLAIR THOMSON said he supposed members might assume it was a case of syphilitic peripheral neuritis, but this was only surmise. He counselled modesty in diagnosis because it had been shown that in sixty-five cases out of 150 the cause could not be definitely determined during life. He urged the importance of doing tracheotomy, as any patient with inspiratory stridor was in danger of losing his life, and was daily lowering his vitality, owing to back pressure on the heart. A foggy day might cause fatal embarrassment. In the journals one might often read that a tracheotomy in such cases was quite successful, and yet the patient died! The death, of course, having taken place from cardiac failure.

Professor HOBDAY said that for years he had been hoping to see a case in connexion with which he could bring forward his idea as to the efficacy of the laryngeal ventriculo-stripping operation in the human subject—an operation which had been found to be of value in so many cases in the horse in alleviation of the condition known as "roaring," instead of the performance of tracheotomy. He had now done the operation in over 2,000 cases in the horse. In that animal it was always the left cord which was paralysed, though sometimes, whilst the horse was under deep anaesthesia, it would appear as if the opposite cord was also involved. The operation was a simple but delicate one, and consisted in the removal of the lining membrane of the ventricle of Morgagni, the result being a permanent fixation, by adhesion, of the paralysed cord to the side of the larynx, and in that way the respiratory passage was left permanently open. He had seen a roarer (a hunter) which was purchased for £65 before the operation, realize over £400 eight months afterwards. Fifteen years ago he brought the subject before a meeting of the Society and on that occasion the late Sir Felix Semon asked what became of the voice. He (the speaker) at that time replied that the horse was always dumb

afterwards, and that it could no longer neigh. Since then, however, he had had many more opportunities of making observations upon this point, and he had found that animals which had been operated upon learnt to use their vocal cords afterwards, and recovered their voices, although they did not neigh so loudly as a normal horse; hence that objection no longer held and he thought that a human being would equally recover the voice. If the operation he had mentioned proved to be efficacious for mankind, he would feel very proud that a member of the veterinary profession should have been the pioneer of it.

Mr. VLASTO (in reply) said he knew nothing of "roaring" in horses, but had been much interested in Professor Hobday's remarks. He understood the operation consisted in removing the lining membrane without touching the cartilage. The matter needed careful consideration. He was afraid that his patient was averse to any operative interference, but every effort would be made to induce him to protect himself by tracheotomy from a sudden crisis. He would seek a conversation with Professor Hobday, with a view of considering the question of the "ventricle stripping" operation on this patient.

The PRESIDENT said the members of the Section would have a further opportunity of hearing Professor Hobday at the Summer Meeting, when it was hoped that he would bring some specimens of the larynx of the horse, for comparison with the human larynx. Very much depended on the comparative structure of the ventricle in the horse and man.

Case for Diagnosis.

By T. JEFFERSON FAULDER, F.R.C.S.

MR. A. J., aged 61. History of soreness of the throat for past twelve months. No dysphagia. There is a copious secretion of mucus and some alteration of voice. Dyspnoea and inspiratory stridor. Wasting. Wassermann reaction negative. On examination, hypopharynx full of mucus. A pale red growth projects from the right false cord. The movements of the true cords are normal.

DISCUSSION.

Dr. SYME said he thought the man had a double growth—the main growth on the posterior portion of the left cord, and an implantation growth on the opposite cord. The left side of the larynx appeared to be fixed.

Mr. J. F. O'MALLEY said the condition appeared to be bilateral, the growth being confined to the right side and the alteration in appearance on the other side being probably due to pressure caused by the growth. He regarded it as a carcinoma.

Sir JAMES DUNDAS-GRANT thought the disease was confined to the right side of the larynx, and there was a swelling of the right ventricular band as if it had been pushed inwards by the disease. The vocal cords could not be much affected, as the voice was good, and, in the absence of pain on swallowing, it was difficult to believe there was a post-cricoid epithelioma. Such an obscure case should be examined by the direct method, in order to ascertain the condition of the hypopharynx. The slowness of the progress was against the diagnosis of malignancy.

Sir STCLAIR THOMSON did not think it was malignant, especially as it was not infiltrating and the cords moved freely. The presence of so much froth in the sinus pyriformis suggested there was an attachment deep in the larynx, in the ary-epiglottic fold. He was reminded of a case shown before the Section, which turned out to be a fatty tumour. The present neoplasm he considered to be innocent. It could be completely removed by the indirect method, and then the microscope would settle the diagnosis.

Mr. H. VINCENT FORSTER (Liverpool) said he was satisfied he saw the right vocal cord move through an interval of space between the laryngeal wall and a finger-like process of growth passing forward from the posterior end of the right ventricular band.

The PRESIDENT thought it was not wise to express an opinion until examination had been made by the direct method, although the removal might be better done by the indirect method. He concluded the condition was not malignant on account of the free movement of the cord, and also because of the absence of infiltration. The nature and origin of the growth could only be guessed at, and he hoped Mr. Faulder would report further on the case, as it was a very instructive one.

Mr. JEFFERSON FAULDER (in reply) said the man had been under his observation only two or three weeks; he had lost weight, but never had dysphagia in the sense of inability to swallow. Until to-day he had not succeeded in fully seeing the vocal cords. He would try again, with the aid of a little local anæsthesia, and make a further report.

Case of Hoarse Voice for Diagnosis.

By T. JEFFERSON FAULDER, F.R.C.S.

MRS. G. Hoarse voice since July, 1920. No dyspnœa. Aphonia for two months. No dysphagia. Patient has some pain at back of neck. There is a polypoid growth springing from the anterior end of the left false cord, lying on the true cord. Movements of cords normal.

DISCUSSION.

Dr. COUBRO POTTER and Dr. SYME considered the growth was an innocent one.

Mr. FAULDER replied that the patient's larynx was difficult to examine, on account of retching. He would attempt endolaryngeal removal of the growth.

Sarcoma (?) of Frontal Bone.

By G. W. DAWSON, F.R.C.S.I.

MALE, aged 65. Seven weeks ago a hard, smooth, painless swelling appeared on the centre of the forehead, extending from the hair margin to the glabella, but not affecting the bridge of nose.

Patient suffers from headache, is subject to colds, and has had nasal discharge for years. A few polypi are seen in the ethmoid region along with pus.

X-rays show a rarefied area above frontal sinus.

DISCUSSION.

Mr. LAYTON considered the lesion was inflammatory.

Mr. C. W. M. HOPE had recently seen in hospital a patient with a similar swelling, and temperature of 103°. She had sinusitis and polypi in the nose. Gumma was suspected. The swelling was opened, a piece of the wall removed, and microscopically it was found to be gummatous. But the temperature persisted, and patient died of thrombosis of the cavernous sinus and brain abscess. He regarded the present case as a gummatous swelling of the frontal bone.

The PRESIDENT thought it was neither gumma nor mucocele, but a simple inflammatory condition, which had extended upwards. The sooner the nose was cleared of polypi and the frontal sinus evacuated, the better; if there was delay in this extensive bone trouble might result.

Mr. DAWSON (in reply) agreed with the President that the condition was neither gumma nor mucocele, because the incidence of the disease was mostly above the frontal sinus, as shown in the radiogram. He thought the diagnosis lay between gumma, simple sinusitis and sarcoma. Dr. Hill had advised radium treatment.

Postscript.—Pathological report by Dr. Hunt (subsequently received): "A malignant growth of epithelial type, the cells being of a squamous character."

Section of Laryngology.¹

President—Dr. W. JOBSON HORNE.

Bilateral Abduction Paralysis in Exophthalmic Goitre.

By T. B. LAYTON, M.S.

K. M., AGED about 45, has been under treatment since 1895 for exophthalmic goitre. She has also suffered from attacks of sore throat, which she dates from diphtheria in 1887. For these the exhibitor removed her tonsils in 1913. She occasionally still suffers from moderately severe attacks of sore throat. There is marked exophthalmos but no neck swelling now. The vocal cords are both deficient in abduction.

DISCUSSION.

Sir JAMES DUNDAS-GRANT asked whether the genuine complex of symptoms of exophthalmic goitre was present in this case, and what was the sequence of events; whether the sympathetic nerve was irritated by an enlarged thyroid, and the recurrent nerves compressed?

Dr. KELSON thought there was limitation of adduction as well as of abduction.

Mr. G. W. DAWSON said he had seen two cases of tumours of the thyroid for which there had been no operation, and which produced paralysis of one cord.

Mr. E. D. D. DAVIS and Sir WILLIAM MILLIGAN had examined a number of exophthalmic goitre cases, but had never seen paralysis of the vocal cords. The former thought there might be some malignant change, whilst the latter suggested a toxic cause, e.g., alcohol, or a lead neuritis.

The PRESIDENT said he thought that in spite of any surgical interference there was a defect in the movements of the cords. Many cases of impaired movement after operation had been brought forward, in which the impaired movement was attributed to the operation, and this case seemed to suggest that surgery had been held responsible for more than it ought to have been. His experience coincided with that of Sir William Milligan and Mr. Davis; though he had examined the cords as a routine in all cases of exophthalmic goitre he had seen, he had not seen paralysis of cords in them.

Mr. LAYTON (in reply) said that as attention had been drawn, at the Section, to the damage done to the cords by surgery, he thought it would be interesting to realize that cases of such paralysis did occur without the surgeon's aid. He did not know the detailed history of the case sufficiently well to reply to Sir James Dundas-Grant and Sir William Milligan; but when he saw the patient in 1913 her exophthalmic goitre was in the same condition as now; she had had no symptoms except the exophthalmos since 1910. In reference to the possibility of lead poisoning, he might be able to obtain information as to that. He did not believe she was alcoholic. He agreed with Dr. Kelson's remark, and believed that in the left cord there was not only paralysis but also fixation of the left aryteno-epiglottoid joint, and with regard to the right cord, that the glottis did not completely close on phonation.

¹ At a meeting of the Section, held May 6, 1921.

Frontal Sinusitis during Scarlet Fever.

By T. B. LAYTON, M.S.

E. S., GIRL, aged 12, developed a mild attack of scarlet fever on February 10. She had a relapse on March 7. On March 19 the temperature rose again without apparent cause except for some enlarged glands in the neck. On March 25 swelling of the right side of the forehead appeared, and this extended to the left side on the next day. By March 30 the temperature had fallen, and the puffiness of the eyes, which had accompanied the swelling, had subsided. The swelling was then 2 in. in diameter, was situated on the forehead above the inner end of the right eyebrow and fluctuated. Some swelling and excess of secretion was seen in the region of the right middle turbinal.

On April 2 the swelling was exposed by a flap formed by incisions within the hair-line and in the eyebrow, joined at their outer ends. The swelling proved to be a subperiosteal abscess; the bone beneath was healthy, but a track led down to the front of the inner wall of the orbit, where the pus had escaped from the ethmoidal cells through the lacrymal bone. The frontal sinus was full of pus. This sinus was obliterated, and the front part of the ethmoidal labyrinth was removed with forceps. The cavity was drained into the nose and at the inner angle of the orbit, and the flap sewn up. Subsequently the angles of the flap sloughed, leaving an ugly scar.

Bilateral Subperiosteal Suppuration of the Orbit during Scarlet Fever, due to Ethmoidal Suppuration (Orbital Cellulitis).

By J. F. O'MALLEY, F.R.C.S.

H. R., MALE, aged 19. September 29, 1920: Admitted to hospital when peeling after scarlet fever. Swelling over the left eye began the previous day and spread to the right side a few days later. Treated by fomentations for a few weeks and abscess at inner end of orbit opened.

First seen by exhibitor early in November, and diagnosis made of sinus suppuration. There was bilateral swelling of both upper eyelids and supra-orbital regions, very marked on the left side, with a discharging sinus above the left inner canthus. Chemosis of conjunctiva and exophthalmos. Mucous membrane of nose was deep purple red, bled freely on being probed; middle turbinates were hypertrophied and pus seen under the left conjunctiva. Both middle turbinates removed and rubber drainage tube passed through sinus into nose. Both swellings disappeared quickly, sinus closed, and remained so for over six weeks. Later, swelling appeared again and sinus re-opened. Adhesions had caused obstruction to ethmoidal drainage.

Early in January, 1921, adhesions and polypi removed and ethmoidal labyrinth opened freely and rubber tube inserted through sinus in eyelid into nose; since then no recurrence of swelling, but some small polypi can be seen in the nose, which it is proposed to deal with later.

DISCUSSION.

Sir WILLIAM MILLIGAN said that fifteen years ago he saw a lady who had been successfully operated upon four times for frontal sinusitis. She had a very disfigured fore-

head, with a sinus discharging in the mid-line. The two questions were, whether the suppuration could be arrested, and whether, later, the deformity could be rectified. By removing the bone disease he succeeded in arresting the suppuration, but the deformity was worse than ever. To correct the deformity he used a gold plate after excising a considerable amount of scar tissue. He saw patient two years ago, and X-rays showed that the plate was still *in situ* and had greatly relieved the deformity. He suggested that Mr. Layton should try something on those lines.

Mr. W. STUART-LOW said that cases of orbital cellulitis were almost always secondary to nasal ethmoiditis. The second case well illustrated this fact, as it was at once improved by establishing drainage into the nose. It should be recognized that treatment of orbital cellulitis secondary to ethmoiditis was the province of the rhinologist and not of the ophthalmologist. In a similar case he had made a free incision under the lower eyelid and evacuated pus with very good result.

Mr. NORMAN PATTERSON thought that in these cases an incision below the lower third of the eyebrow was sufficient.

Mr. LAYTON (in reply) said that a few meetings ago, Mr. Archer Ryland¹ showed a case in which he had operated upon a frontal sinus, and had not room to do the whole operation through the eyebrow incision; and Mr. Tilley then suggested that in such a case an incision could be made in the hairy region, passing down to the zygoma, then forwards, and that it would save an ugly vertical scar across the forehead. He did that in this case, and he thought the girl had just as ugly a scar as she would have after a vertical incision. A portion near the outer end of the eyebrow subsequently sloughed, and would leave an ugly scar corresponding with the temporal muscle. The whole incision should not be done at the same time. When he saw the swelling under the eyebrow he concluded that there was osteitis of the outer table of the skull, and there might be the same condition in the inner table, necessitating operating on the bone higher up, which could not be done through the eyebrow incision. He found that the part on the forehead was simply subperiosteal, and that the pus had left the sinus through the bone under the lacrymal sac, and then tracked round the upper margin of the orbit, under the periosteum. In this case, therefore, the whole incision could have been done in this position. He would not attempt a flap in any condition which had even a suggestion of acute inflammation still going on. It was interesting that there should be a fluctuating swelling above the eyebrow without osteitis of frontal bone, followed by a tracking of pus. In answer to Mr. Norman Patterson, it seemed to him essential that there should be free drainage into the nose. He would consider Sir William Milligan's suggestion later.

Mr. J. F. O'MALLEY (in reply) said the interesting question was why these cases should arise in connexion with scarlet fever. He thought that there was some anatomical crowding of the middle turbinals, and obstruction prior to the infection. This was accompanied by a particular virulence in the organisms associated with scarlet fever which produced an active inflammatory process and caused denudation of the epithelium. There followed adhesions which prevented drainage from the fronto-ethmoidal duct and middle ethmoidal cells, so that any pus there would be locked in, and as it increased it would find an outflow in another direction. When he first saw the case the condition was five or six weeks old; and the abscess had pointed at the inner angle, at the place where Mr. Patterson suggested making an incision. At that site he (Mr. O'Malley) made the incision, but the swelling did not subside. Later, by draining the ethmoidal region and connecting the external abscess with that region, the swelling subsided, but there was still ethmoidal disease present, which he would deal with.

¹ *Proceedings*, 1921, xiv, p. 15.

Specimen to show Artificial Emphysema of the Right Half of the Larynx, produced by Pressure of Air through the Trachea after a Puncture of the Subcordal Mucous Membrane.

By Sir JAMES DUNDAS-GRANT, K.B.E., M.D.

THE larynx, with hyoid bone, and a portion of the trachea, was removed from a fresh cadaver. A test-tube fitting the trachea was drawn out at its closed end so as to be adapted to the rubber tubing of a laboratory blow-pipe bellows. A microscopic teasing needle was pushed through both arytaenoid cartilages held in tight apposition by dissecting forceps. When the vocal cords were made tense by pulling the arytaenoid cartilages backwards and the hyoid bone forwards, and the bellows was worked, loud bleating sounds were produced varying in pitch according to the degree of tension of the vocal cords. A curved needle was then introduced from above outwards, through the glottis and a tear was made under the right vocal cord. When the bellows was worked a swelling of the entire aryepiglottic fold took place, and on closer examination it was seen that the ventricular band formed part of the swelling and the ventricle was flattened out. No sound was emitted. The larynx was then opened and a fine pipette introduced through the tear under the vocal cords, through which some liquefied agar-agar was injected and allowed to solidify, as in the specimen now exhibited. The resemblance to the appearance in Dr. Spicer's case is almost identical.

DISCUSSION.

Dr. IRWIN MOORE said he could not accept Sir James Dundas-Grant's comparison of this pathological specimen with Dr. Spicer's case, in which the swelling was confined to the anterior third of the larynx and emanated from the ventricular opening. In the specimen shown he did not agree that the ventricle had been everted or flattened out by the emphysema, for the ventricle was still *in situ* and forceps could be passed into it. An ordinary surgical emphysema had been produced by artificially forcing air round the ventricular hiatus, leaving the ventricle in its normal position. The symptoms in Dr. Spicer's patient had existed for twenty-two years. It was very unlikely that a traumatic tear of the mucosa during life would remain patent during twenty-two years; the emphysema would gradually disappear.

The PRESIDENT agreed with Dr. Irwin Moore. He looked upon Dr. Spicer's case as a congenital cyst originating in the ventricle of the larynx, and was not sure that it did come through the mouth of the ventricle; he thought it found its way through the thin spot in the roof of the ventricle to which he referred at the last meeting.

Sir JAMES DUNDAS-GRANT (in reply) said he did not agree with Dr. Irwin Moore and the President. He did not see how by vocal effort pressure could be produced in the sacculus of the larynx to bring about distension, such as occurred in Dr. Spicer's case, as the vocal cords underneath diminished the force of the air pressure. He still adhered to the opinion that in Dr. Spicer's case the air entered from an orifice underneath the vocal cord; otherwise he did not see how else this "gas-bag" appearance could be produced.

Tumour of Pharynx in a Young Man.

By W. H. KELSON, M.D.

F. S., MALE, aged 38, shop assistant, states that he has been operated on for enlarged tonsils and adenoids and also has had treatment for antral, ethmoidal, sphenoidal and frontal suppuration. He says that the swelling in the neck and pharynx came on suddenly in 1908. It gives no pain and remains about the same, though sometimes it appears to affect his breathing somewhat.

On examination there is found to be a firm rounded mass on the left side of the neck, and on looking at the pharynx what looks like a much enlarged left tonsil is to be seen overhanging the larynx.

Opinions as to diagnosis and treatment were invited.

DISCUSSION.

Sir JAMES DUNDAS-GRANT thought the condition was lymphadenoma, or very possibly lympho-sarcoma, of the tonsil.

Mr. G. W. DAWSON did not think the tonsil had anything to do with the tumour; the tonsil was freely movable over the tumour. He suggested a dermoid cyst.

Mr. VLASTO thought that the history of bleeding following an operation on the throat and the sudden onset of the swelling suggested traumatic aneurysm of the internal carotid. He recalled a similar case under the care of Mr. Trotter eight years ago, that of a boy, aged 13, who had a swelling on the left side of the neck of considerable size, and without expansile pulsation. Lymphosarcoma of the tonsil was diagnosed. During dissection of the glands of the neck preliminary to the extirpation of the growth an aneurysm was discovered. Eight years previously patient had had a quinsy opened on the same side and this was followed by profuse hæmorrhage.

Sir JAMES DUNDAS-GRANT thought there was paralysis of the left vocal cord.

Mr. CYRIL HORSFORD had had a similar case of a swelling on the right side, with some internal pulsation. In consultation, Mr. Trotter considered that it was not connected with the tonsil, but was probably an aneurysm of the carotid. Mr. Trotter found on operation a neuroma of the vagus nerve and excised it.

Mr. E. D. D. DAVIS said the case mentioned by Mr. Vlasto was first seen by Mr. Waggett and referred to Mr. Trotter for opinion. The mother stated that a peritonsillar abscess had been lanced and that nearly fatal hæmorrhage and paralysis of the opposite arm and leg had resulted. Twelve months later the tonsils were excised with a sharp guillotine, and subsequently a soft tumour developed behind the posterior faucial pillar extending upwards to the nasopharynx. Sarcoma was diagnosed and Mr. Trotter operated with the result reported. The boy was seen a few years later at the age of 18 when he was quite fit.

Sir WILLIAM MILLIGAN suggested a lipoma. He once operated on a similar case by an incision behind the sternomastoid muscle, and removed the mass, which proved to be a lipoma the size of the palm of the hand. In the case shown, dating from 1908, it was unlikely that it was a lympho-sarcoma. Also it was a long history for aneurysm without other manifestations. The slow growth suggested a lipoma or neuroma.

Mr. STUART-LOW said he had a patient, who, after a blow on the side of the neck, developed much thickening of the neck and tonsils on the same side. This was diagnosed as simple hypertrophy of the lymphatic structures; it had an elastic feeling, very like the case here shown. Syrup of iodide of iron was given for some time with marked benefit, and the condition ultimately cleared up.

Dr. Kelson (in reply) said he did not see how it could be aneurysm, there was no pulsation. He thought the paralysis of the left cord might be due to stretching of the recurrent nerve by the tumour without assuming malignancy. He would try radium, and if unsuccessful, he would operate, and report later.

Excision of Pharyngeal Pouch followed by the Formation of a Carcinoma at the Site of Operation.¹

By W. H. Kelson, M.D.

SPECIMEN removed post mortem from a man aged 78, who seven years ago had a pharyngeal pouch removed by exhibitor. A malignant growth (slide) can be seen at the seat of the former pouch, the hypopharynx and upper part of the œsophagus are much dilated. Gastrostomy became necessary a few weeks before death.²

Case of Pachydermia of the Vocal Cord.

By E. D. D. Davis, F.R.C.S.

A COMEDIAN, aged 46, was first seen in January last complaining of hoarseness and inability to sing. Both vocal cords were red and injected, and patches of pachydermia were seen on the right vocal cord. Movement of cords normal. Nose and pharynx catarrhal. Wassermann reaction negative.

An unsuccessful attempt was made to remove a sufficiently large piece of the pachydermia of the right cord for microscopy, and since then there has been no appreciable increase in the thickening.

Potassium iodide and all other treatment has been useless. Is it an early epithelioma and should the right vocal cord be removed?

Laryngeal Case for Diagnosis.

By G. W. Dawson, F.R.C.S.I.

PATIENT, a female, aged 30. Hoarse for six years. Irregular growths are seen on the vocal cords and in the interarytænoid space. Some removed, are of very hard consistence, like fibromatous tissue.

DISCUSSION.

Sir JAMES DUNDAS-GRANT regarded Mr. Dawson's case as one of mitigated tuberculosis, i.e., lupus, and there had been disease in the nose, which might well have been the forerunner. Mr. Davis's patient showed a very red and swollen vocal cord. The condition was confined to one side, which was unusual in pachydermia. It might be early epithelioma, and he thought it ought to be removed.

Mr. LAYTON thought both were cases of tubercle. In Mr. Davis's case, however, before he removed the cord he would want strong evidence that tubercle was not present. The appearance did not tally with that of pachydermia.

¹ See *Proceedings*, 1921, xiv (Sect. Laryngol.), p. 44.

² This specimen is now in the Museum of the Royal College of Surgeons. Professor Shattock reports that the carcinoma was of the common squamous-celled variety.

Mr. O'MALLEY agreed with Mr. Layton's view of Mr. Davis's case. There appeared to be limitation of the movement of that cord, in which case one must regard it as early epithelioma, and it should be watched. He thought Mr. Dawson's case was one of tubercle.

Mr. FAULDER thought Mr. Davis's case was an exceptional instance of traumatic laryngitis. He did not think the left cord was normal; there had been hæmorrhages into both cords. The cause might be found in the man's occupation. The condition had not varied for a considerable time, and one often saw hæmorrhages in the cords of comedians.

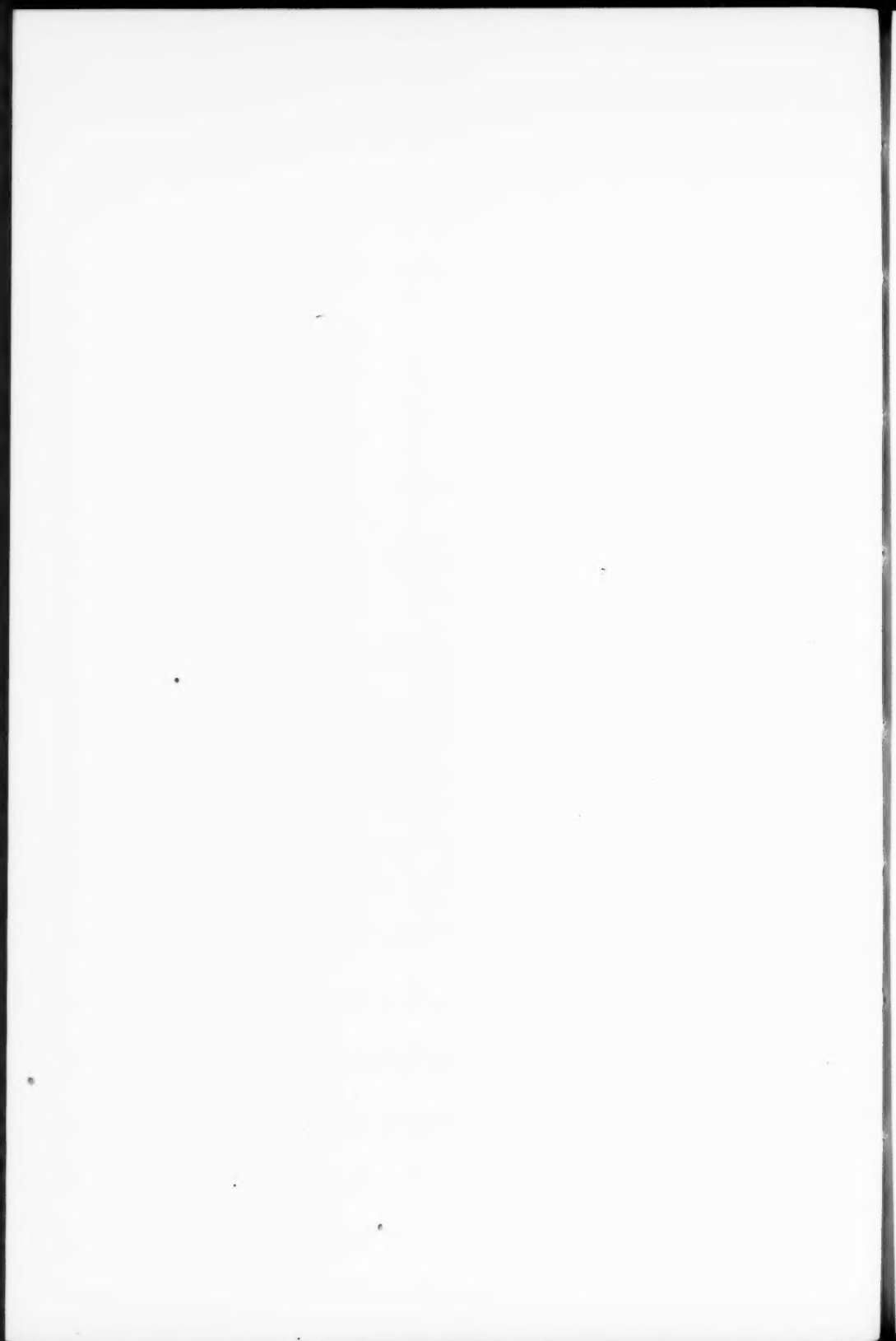
The PRESIDENT asked whether the factor of syphilis had been excluded in Mr. Dawson's case.

Dr. KELSON inclined to the view that Mr. Davis's case was syphilitic. He did not notice any impairment of movement of the cord. If the condition did not clear up under salvarsan and iodide of potassium, he advised a laryngo-fissure.

Mr. E. D. D. DAVIS (in reply) said that chronic laryngitis had followed the improper and over-use of the voice. There was some thickening of the edge of the left cord in its anterior third. Mr. Waggett agreed with him that the right cord was not fixed. He was inclined to excise the right vocal cord, but the patient might refuse as his living depended on his voice. Tuberculosis was excluded by the absence of loss of weight, temperature, and physical signs, and also a negative sputum.

Mr. DAWSON (in reply) said the larynx showed some reaction following the removal of a portion of the growth the previous day. Tubercle had not occurred to him, since there was no swelling, and the growths looked like papillomata. Syphilis had not been considered a factor.

Postscript (Mr. Dawson's case): Pathological Report.—Papilloma.



Section of Laryngology.¹

President—Dr. W. JOBSON HORNE.

Foreign Body (Collar Stud) in the Œsophagus of an Infant, causing Spinal Osteomyelitis and Death.

By DOUGLAS GUTHRIE, M.D.

PATIENT, aged 9 months, previously healthy, and with no history of foreign body, was admitted to hospital, presumably suffering from bronchopneumonia. For a few days there was improvement, but when seen by exhibitor, ten days later, the patient looked very ill, had a metallic cough, and the temperature was 102° F. Physical signs in the chest consisted of only a few scattered moist râles, and a wheezing sound audible on expiration (Jackson's sign). No difficulty in swallowing had been observed.

X-ray screen examination showed a small dense shadow, slightly to left of middle line, at level of tracheal bifurcation; above this a diffuse shadow extending towards apex of right lung.

Whilst the larynx was being examined by direct laryngoscopy and mucus being mopped up (without an anæsthetic, general or local) the pulse and respiration suddenly ceased. Immediate tracheotomy, followed by bronchoscopic insufflation, was of no avail. Autopsy revealed a large bone stud in the œsophagus, just above the level of the tracheal bifurcation. The base of the stud was in the œsophagus, while the head had ulcerated through the posterior wall and projected into an abscess, the size of a walnut, which occupied the body of the third dorsal vertebra. Only a thin lamina of bone separated the abscess cavity from the spinal canal, and at this point there was localized inflammation of the meninges.

Abscess of the posterior mediastinum, following a foreign body in the œsophagus, is not uncommon, but the exhibitor is not aware of any other case in which the vertebral column became eroded to such an extent.

The case serves as a reminder of the possibility of the presence of a foreign body in obscure diseases of the chest.

(Specimen and water-colour drawing were shown.)

DISCUSSION.

Dr. IRWIN MOORE asked what Dr. Guthrie considered had been the cause of death.

Dr. GUTHRIE (in reply) said he thought the cause of death was shock in an emaciated child. Possibly there had been some pressure on the spinal cord, as the entire body of the third dorsal vertebra had been converted into an abscess, into which the small end of the collar stud projected. He suggested that in such cases where there was little to account for chest symptoms the laryngologist should be called in earlier.

¹ At a meeting of the Section, held June 3, 1921.

Demonstration of New Tracheotomy Tube.

By ARTHUR CUBLEY, M.R.C.S.

(Introduced by Mr. T. B. LAYTON.)

AN improved Parker's tube, consisting of a movable shield with circular apertures, in place of wire loops, for attachment of tapes—also special attachment for outer tube to shield, allowing greater facilities for cleaning. The arms of the tube are lengthened, so as to prevent slipping out of the trachea. The pilot, instead of being solid, is designed (on section like a cross) so that whilst the tube is being inserted into, or actually lying in, the trachea, the child is able to breathe quite easily without removal of the pilot; hence there is no need for hasty insertion of a tube, or difficulty in ascertaining whether the tube has entered the trachea or not.

Case of Subglottic Thickening, at first diagnosed as Primary Laryngeal Tuberculosis.

By Sir STCLAIR THOMSON, M.D.

PATIENT, a male, aged 37, lost his voice suddenly after exerting it in July, 1920. In December the larynx was normal except the right cord, which was congested, and there was limitation of abduction. The case was regarded as due to voice strain. On February 25, 1921, the right cord was freely mobile, but congested, with velvety infiltration and a clean ulceration on the inner surface of the anterior third. Wassermann reaction negative. He has been in two sanatoria, but no definite evidence of pulmonary tuberculosis can be found. The X-ray plate shown does not suggest anything definite. Now, after two months, the movement of the cord is sluggish, chiefly on abduction; there is no abrasion on the surface of the cord; and the subglottic thickening, below the anterior third of the cord, is more evident.

DISCUSSION.

Sir STCLAIR THOMSON added that the case showed the difficulty of diagnosis in certain cases of laryngeal disease, and that time was needed to make the diagnosis. No confirmatory evidence of tubercle had been found, and the condition had not been improved by voice rest. He believed the patient had some subglottic trouble, and it might be difficult to settle the diagnosis without an exploratory laryngo-fissure.

Mr. HERBERT TILLEY did not think the case was tuberculous, nor specific. He did not like to commit himself as to malignant disease. He advised a direct laryngoscopic examination, with a lipped tube, so that one could look beneath the cord, and if the diagnosis was then doubtful he recommended a thyro-fissure. The only other treatment seemed to be the application of cross-fire X-rays.

Dr. DONELAN recommended removal of a piece for microscopic examination. If it was his own vocal cord, he would agree to a thyro-fissure being performed.

Dr. SYME advised examination by suspension laryngoscopy, since if laryngo-fissure was performed the diagnosis would not be certain without microscopic examination. He thought it might be epithelioma.

Mr. E. D. D. DAVIS also advised suspension laryngoscopy, but under local anæsthesia. In this way a good view of the under surface of the cord could be obtained.

Mr. STUART LOW thought there was a chronic inflammatory change going on, due to sudden exertion and ecchymosis accompanied by a septic mouth and tonsils. He advised a month's treatment with Burney Yeo's inhalation of creosote, carbolic and eucalyptus, hygienic surroundings and attention to the mouth.

The PRESIDENT agreed with Mr. Tilley that the condition did not seem to be tuberculous. Six weeks of silence had not improved the condition, and movement of the cord on that side was definitely impaired. A more thorough examination was required to ascertain the condition of the anterior commissure, to see whether there was extension across to the other side. If so, he favoured operative treatment without further delay.

Sir STCLAIR THOMSON replied that he had already changed his diagnosis of the case twice. Seeing the patient several times, under different conditions, was a distinct advantage, especially in probable neoplasm or tubercle. He would make a direct examination, which he thought was more helpful than suspension laryngoscopy in getting a view beneath the cords. He could not agree with Mr. Stuart-Low, because he could not think infection would so limit itself to one cord. He thought this might be a specific disease. Removal of a piece for examination, by way of the mouth, would only confuse the diagnosis. During laryngo-fissure one had to trust to the naked-eye appearances, unless a pathologist was present to make an examination at the time, and the surgeon should be prepared to go on and remove the disease, even on a doubtful or suspicious diagnosis.

Tuberculosis of the Larynx which has now remained healed for Four Years after Treatment by the Galvano-cautery.

By Sir STCLAIR THOMSON, M.D.

MISS A. C. was admitted to the Sanatorium at Midhurst in 1911 with a history of six months' illness and hoarseness. She had mammelated ulcerated infiltration of the interarytænoid region and of both vocal processes. The galvano-cautery was commenced in August, 1912, and she had eighteen applications between that date and May, 1917. The larynx has remained scarred. There is a white ridge of scarred tissue across the interarytænoid region and a small web of scarring between the posterior ends of the cords. This causes some stenosis and shortness of breath. But the cords are quite clean and even and the patient can use her voice freely.

Tuberculosis of Interarytænoid Region, Right Vocal Cord, Right Vocal Band, and Left Vocal Process, treated with the Galvano-cautery.

By Sir STCLAIR THOMSON, M.D.

MR. R. F. H., admitted to Sanatorium February, 1920, with lesions of both upper lobes and with tubercle bacilli in sputum. Galvano-cautery treatment commenced on May 23 and seven treatments since. His general condition is excellent, although tubercle-bacilli are still present in sputum.

Tuberculosis of the Larynx under Treatment with the Galvano-cautery.

By Sir STCLAIR THOMSON, M.D.

MALE, aged 17, admitted to Sanatorium at the beginning of 1919 when the whole of the right vocal cord was ulcerated. Treatment was postponed until October when his general condition was quiescent and he was doing "full grade" in the way of gardening work. Between October, 1920, and the present date he has had six treatments with the galvano-cautery. The right cord is now cicatrizing although a large portion of it has been destroyed.

DISCUSSION.

Mr. TILLEY asked under what conditions the galvano-cautery should not be applied, and how far Sir StClair would be guided by the evening temperature and loss of weight and appetite. If there was to be any lasting benefit from local treatment there must be an improving condition of the primary lung mischief.

Sir JAMES DUNDAS-GRANT asked whether Sir StClair would regard it as a rough rule that a "bed" case should not be submitted to galvano-cautery treatment. If a case were treated too frequently and strenuously the patient would have a necrotic reaction instead of a fibrous one.

The PRESIDENT agreed with Mr. Tilley that one must first build up the patient's strength. Possibly the larynx would have improved without the cautery treatment.

Sir STCLAIR THOMSON (in reply) agreed, generally, with what Mr. Tilley and Sir James Dundas-Grant said. Local cautery treatment for disease of the larynx was not even considered unless the general disease was either arrested or improving. The female patient had been in and out of the sanatorium for a year or two before the cautery was applied. The other two were free from temperature for six and nine months, had good appetites, and were on work grades in the sanatorium. These patients were kept at rest until the temperature had subsided for weeks, and then they were put on to light garden work. Treatment by cautery was applicable to only a few of the cases, because the fact of having tubercle of the larynx meant either that they had an acuter infection than the average, or that their resistance was specially low. His (the speaker's) statistics (previously published)¹ showed that the percentage of deaths rose from 15 per cent. in Group I, to 42 per cent. if they had a lesion in the larynx; while in Group II it rose from 38 per cent. to 63 per cent.

Intrinsic Epithelioma of the Larynx in a Woman, aged 35.

By Sir STCLAIR THOMSON, M.D.

A LARYNGO-FISSURE performed on October 21, 1920. An irregular, knobby, non-infiltrating growth invaded the whole length of the left vocal cord. The cord moved freely. No preliminary microscopic examination. Convalescence was retarded by the fact that several pieces of catgut were expectorated and also worked out through the scar. This explains why the cicatrix in the neck is not as thin as usual. Six weeks after operation, a large granulation was seen in the anterior commissure, but this disappeared spontaneously.

Of fifty cases of laryngo-fissure only six have been females.

¹ *Trans. Med. Soc. Lond.*, 1914, xxxvii, p. 225.

Case of Laryngocele; after Operation.¹

By FREDERICK SPICER, M.D.

DISCUSSION.

Sir JAMES DUNDAS-GRANT said now that a portion of the air sac had been removed by Dr. Spicer, there was less swelling, as some of the air escaped. The swelling arose from the anterior part of the larynx, and the ventricle and saccule seemed to be involved in it. He thought the air must be driven up from beneath the vocal cord. He referred to his experiment on the specimen of larynx exhibited at the previous meeting, and asked whether inspection by direct endoscopy could not be made beneath the cord for a tear. He thought Dr. Spicer might now remove the flapping portion of the swelling.

Dr. LOGAN TURNER thought the patient might be spared further interference, especially as he was an old man and respiratory difficulty was now lessened.

Extensive Malignant Endothelioma of Nose.

By DAN MCKENZIE, M.D.

THE growth, which had existed for six months, occupied the whole of the left ethmoidal region from the nasal bone in front to the sphenoidal sinus behind. The left maxillary antrum was filled with it, and there were extensions into the back of the left orbit, through the skin near the inner canthus of the left eye, where it was fungating, and into the left alveolar margin in the mouth. A previous attempt had been made to remove the growth and abandoned on account of profuse hæmorrhage. On April 12, the external carotid artery was tied, and four days later, the growth was removed, first through the left alveolar margin and canine fossa, and secondly through the side of the nose, the latter including the external fungation. All the raw surfaces were methodically treated with diathermy. Hæmorrhage was free but not excessive. Convalescence has been afebrile and rapid. Portions of the growth are on exhibition and show the structure of a highly cellular endothelioma "undoubtedly malignant."

Subglottic Tumour. ? Cyst.

By T. JEFFERSON FAULDER, F.R.C.S.

PATIENT, a female, aged 19, with hoarseness for past twelve years. Below the level of the cords there is a smooth grey-white oblong tumour with small vessels in the wall. On phonation or expiration it rises up into the glottis which it almost fills. The tumour is thought to be a cyst attached anteriorly.

DISCUSSION.

Mr. TILLEY considered it was a cyst, and could be easily removed.

Dr. SYME suggested a fibroma, because it had a pedicle and vessels were seen over it.

Mr. FAULDER replied that he would report further.

¹ First shown at meeting of December 3, 1920. See *Proceedings*, xiv, pp. 16-20.

Endolaryngeal Tumour.¹

By T. JEFFERSON FAULDER, F.R.C.S.

MALE, aged 60. When previously shown some members thought the growth was innocent and that it could easily be removed, and others thought that it was malignant. After failure to remove the growth by the indirect method on account of the patient's nervous temperament, direct laryngoscopy was employed. The growth, fleshy, well-defined and broadly pedunculated, was attached to the right ventricular band. Microscopical section showed connective tissue, in various stages of development, covered by thin squamous epithelium, and no signs of malignancy.

Case of Enlarged Tonsils for Diagnosis.

By J. F. O'MALLEY, F.R.C.S.

MALE, aged 56. Increasing difficulty in swallowing and articulating for three years. Tonsils greatly enlarged.

DISCUSSION.

Sir JAMES DUNDAS-GRANT said these were not simply enlarged tonsils, but some form of lymphadenoma, and the patient had recently developed a tumour beneath the scapula, which felt like a fatty tumour. He suggested radium treatment.

Mr. E. D. D. DAVIS said that if the tonsils were removed the pathologist would not be able to say whether it was Hodgkin's disease or not. He had had a similar case, in which he inserted radium into the tonsil, followed by sloughing, and the patient was very uncomfortable.

The PRESIDENT thought it was lymphadenoma, and suggested arsenic treatment.

Mr. O'MALLEY (in reply) said he did not regard it as malignant. He had hoped for advice as to removal of the tonsils.

Case of Acromegaly.

By ELEANOR LOWRY, M.B.

FEMALE, aged 39, complaining of swelling of the nose and enlargement of the hands for two years and headache for four years. There is marked enlargement of face and hands; feet normal in size. Cystic enlargement of the thyroid. Chronic middle-ear deafness.

X-ray Report by Dr. C. C. Bernard.—Pituitary fossa appears large, its floor thickened, and the posterior wall incomplete. (Average measurement of sella turcica on a negative, $\frac{8}{16}$ in. by $\frac{7}{16}$ in. In this case, $\frac{9}{16}$ in. by $\frac{1}{16}$ in.) (Skiagrams were shown and suggestions for treatment invited.)

The PRESIDENT referred to Dr. Leonard Mark's book on "Acromegaly" (London, 1912), which gave much information on the subject.

¹ Further report on case shown on March 4, 1921.

Sarcoma of Antrum, Ethmoid, &c.

By ARTHUR J. HUTCHISON, M.B.

MALE, aged 59, with stoppage of nose and loss of smell fifteen years. In October, 1919, polypi removed from both sides of nose, and a Caldwell-Luc operation performed on right antrum, which was full of polypi and pus. April, 1920: Right cheek swollen, painful and tender; marked displacement of eye; frequent nose bleeding. Moure's operation was performed, a large part of floor of orbit, antro-nasal wall and ethmoids being removed, with very little bleeding. Tissue removed looked something like cartilage: pathologist reported only inflammatory infiltration, no malignancy. X-ray treatment through cheek during May. Cheek remained hard, eye became further displaced, and nose filled up with soft pulsating tissue.

December, 1920: Moure's operation was again performed, large quantities of the pale cartilage-like tissue being removed from orbit, ethmoid, sphenoid and antral regions. Following this there was apparent great improvement at first, eye returning to almost normal position, but with limited inward movement, little pain and little discharge from nose.

In March pain increased and glands under jaw were palpable: radium was applied by Mr. Hayward Pinch externally and internally.

Present condition: No discharge from nose; glands under jaw almost disappeared, but right eye becoming again proptosed; right half of palate swollen; good deal of pain.

Sections of growth removed at both operations showed typical perithelioma.

DISCUSSION.

Mr. TILLEY said there was now a recurrence, which had invaded the orbit, and there seemed no chance of prolonging the patient's life unless the right eye was sacrificed and the orbital growth removed.

Sir STCLAIR THOMSON urged that the fight should not yet be given up, and he narrated a case in which a growth fungated through the alveolus. It was treated with radium, and disappeared. The patient now had a recurrence in the roof of his mouth, and it was proposed that he should again have radium. As Sir Henry Butlin had pointed out, there was no measure of the malignancy in these cases of endothelioma.

Thyro-glossal Cyst.

By W. H. JEWELL, O.B.E., M.D.

G. H., MALE, aged 22, noticed painless swelling of right side of throat two years, possibly longer.

The tumour, which is about the size of half a walnut, is on a level with the larynx and just to the right of mid-line of neck, and fluctuates on pressure. The larynx has always been displaced to the left of the median plane of neck, and by laryngoscopy its position is seen to be oblique.

DISCUSSION.

Sir JAMES DUNDAS-GRANT considered it was probably a tuberculous lesion.

Mr. JEWELL (in reply) said he suggested thyro-glossal cyst because of some maldevelopment of the larynx, and he thought it right to look for some other anomaly. The tumour had been there certainly two years, and the pomum Adami had been always displaced.

Case of Loculation of the Maxillary Antrum, with Suppuration and Reflected Pains, including the Spheno-palatine Ganglion Complex (Sluder), suggesting Malignant Disease.

By Sir JAMES DUNDAS-GRANT, K.B.E., M.D.

MIDDLE-AGED man, seen January 27. Pain in upper part of left nasal fossa dating from December, 1919. Antrum definitely translucent on transillumination. No pus by Lichtwitz' puncture. X-rays, March 29, 1921: Opacity of the posterior part of the antrum, suggesting malignant disease (Wassermann negative) involving the superior maxillary nerve. Antrum opened intranasally through anterior angle (Canfield's method). Incomplete vertical partition found, with exuberant granulations; this being scraped away, pus and granulation débris were washed out.

Microscopical examination: Report, non-malignant. Eventual recovery.

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VOLUME THE FOURTEENTH

SESSION 1920-21

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The Society does not hold itself in any way responsible for the statements made of
the views put forward in the various papers.

Section of Medicine.

President—Dr. A. F. VOELCKER.

Case of Transposition of the Viscera showing a Potentially Bicameral Heart.¹

By Professor ARTHUR KEITH, M.D., F.R.C.S., F.R.S., and
J. J. MacDONNELL, M.R.C.S., L.R.C.P.

A LITTLE girl (M. P.), aged 7 months, was admitted to the Brompton Hospital, under the care of Dr. Batty Shaw, for symptoms suggestive of bronchitis. The child's mother had noticed soon after birth that the heart was beating on the wrong side of the chest, and medical examination showed that there was complete transposition of the viscera. There was some slight cyanosis and dyspnoea, and a diagnosis of congenital heart disease was suggested. The respiratory symptoms became accentuated and it was thought the child was suffering from the "catarrhal cold and bronchitis" which had recently affected other members of the household. Besides the above respiratory and circulatory symptoms the child, which was bottle-fed, had vomited and lost appetite six weeks before admission to the hospital. The family history yielded no points of importance.

On admission to the hospital the child was found to be slightly cyanosed, the *alæ nasi* were working freely and the breathing was of the character familiar in the broncho-pneumonia of children. The cardiac area of dullness lay to the right of the sternum and appeared to be of the normal size; no murmurs were heard; scattered rhonchi were

¹ At a meeting of the Section, held November 23, 1920.

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heard over both lungs, and the breath sounds at the right apex were a little harsher than usual. Below the costal margin a mass was felt reaching lower on the left side than on the right: it had the characteristic sharp lower edge of the liver. The child was badly nourished, peevish, and irritable. There was no clubbing of the fingers. The sickness did not recur, and during the first two or three days in the hospital she took food well. Cough, however, persisted, and at the end of the third day she became much more cyanosed, sweated profusely, and died.

The clinical diagnosis lay between congenital heart disease, complicated by miliary tuberculosis, and capillary bronchitis. Although the symptoms and signs suggested an infection of the lung, the child's temperature throughout its illness was normal, or sub-normal, and despite the blueness of the lips and the ends of the digits, no murmurs indicative of the commoner forms of congenital heart disease were present.

Post-mortem Examination.—The heart was found to the right of the middle line. Owing to the peculiar abnormality found in the heart it is convenient to speak of the right auricle and ventricle of the normally placed and normally developed heart as the "tricuspid" auricle and ventricle, and of the left auricle and ventricle as the "mitral" auricle and ventricle. When the pericardium was opened it was expected that the right ventricle would represent the mitral left ventricle of a normally placed heart, and would be larger and more muscular than the one nearer the middle line; but the reverse was the case, and Dr. A. L. Punch, who conducted the post-mortem examination, found that when a probe was passed upwards through the opened apex of the outer ventricle it could easily be made to enter the right common carotid artery; this aroused the suspicion that although the heart was transposed to the right, there must be some anomaly in the arrangement of its chambers and large vessels. The lungs were free from disease, and showed two lobes only on each side. The liver was greatly enlarged and suggested the "nutmeg" alteration familiar in cases of failing heart. The gall-bladder lay to the left of the middle line; the stomach and spleen were transposed to the right side and the spleen was apparently of normal size; the rest of the alimentary tract was completely transposed, the appendix lying in the left iliac fossa. The heart was examined by Professor Arthur Keith, whose report follows:—

REPORT ON HEART, BY ARTHUR KEITH, M.D., F.R.S.

Although every one of the abnormalities shown by this heart has been frequently described before, I do not know of any case which has presented them in such a peculiar combination.

Broadly speaking, we may say of this patient that all parts of the body were transposed—the heart being on the right, the liver on the left, the spleen on the right; the stomach, small and large bowel, the kidneys, adrenals, arteries and veins, all lying as in a mirrored image of the normal disposition. The great veins were also affected,

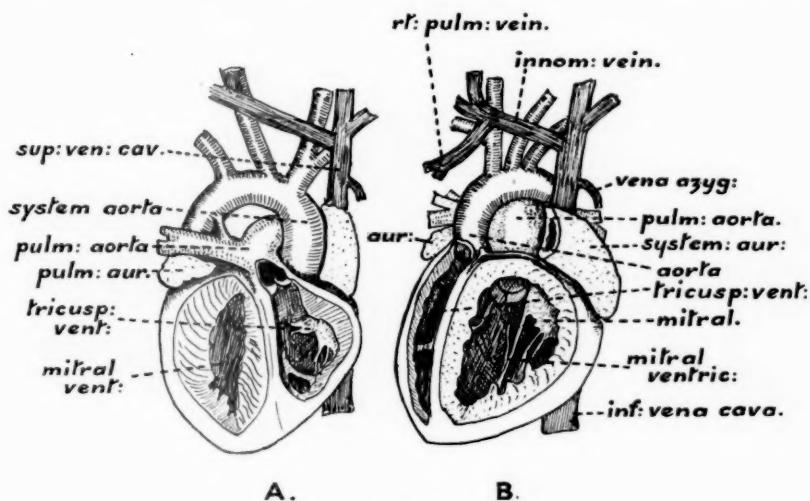


FIG. 1.

A, a heart in which the heart and its chambers are transposed. B, the arrangement of parts in the heart from the case of transposition of the viscera here described.

the inferior vena cava ascending to the left of the spine, and the superior vena cava receiving an azygos vein descending in front of the root of the left lung, to enter a systemic auricle—a right auricle transposed to the left side (fig. 1, B). There had been transposition of the auricles, although, as we shall see presently, the pulmonary veins did not enter the pulmonary auricle, but the systemic (fig. 3, B).

When, however, the ventricles are laid open we come across a

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peculiar aberration in the process of transposition: in fig. 1 A, the arrangement of parts in a regularly transposed heart is shown; the pulmonary or tricuspid ventricle is on the left and the systemic or mitral ventricle is on the right.

In the heart here described (fig. 1, B), although the apex lies in the right nipple line, the ventricular chambers are not transposed; the "mitral" or systemic ventricle lies to the left and in front, the tricuspid or pulmonary ventricle lies to the right and behind. We cannot use the usual terms "right" and "left" ventricle, nor can we justly use "pulmonary" and "systemic," for in this case the ventricle, which normally pumps blood into the pulmonary aorta, forces it into the systemic aorta, and the normal left or aortic ventricle pumps into the pulmonary aorta. There has been transposition of the aortic stems in relation to their respective ventricles. There cannot be any doubt about the identification of the ventricles—the normal left ventricle is characterized by the presence of a "mitral" valve, the absence of an infundibulum or bulbus, a definite disposition of the branches of the A.V. bundle and the form of its wall. The right ventricle also has its characteristics. In this case then, the ventricle with the tricuspid valve and infundibulum—representing the normal right ventricle—communicates through its auriculo-ventricular orifice with the pulmonary auricle, which represents the normal left, and pumps its contents into the systemic aorta, which occupies the position of a pulmonary aorta. That it is the systemic aorta is known by the structure—its continuity with the aortic arch and descending aorta, and by its giving off the two coronary arteries (fig. 2). The mitral (normal left) ventricle opens by its auriculo-ventricular orifice into the systemic (normal right) auricle, and receives not only all the systemic venous blood, but also all the arterial blood from the lungs—for, as will be described in detail later, the pulmonary veins end in the systemic, not in the pulmonary, auricle. The blood thus received by the mitral ventricle is pumped into the pulmonary aorta, which occupies, at its origin, the position normally held by the systemic aorta. The pulmonary aorta is dilated into a sausage-like vessel which fills the whole concavity of the arch of the aorta (fig. 1, B); its transverse diameter measures 18 mm. in contrast with 12 mm. for the corresponding diameter of the aorta. The blood leaves the pulmonary aorta by very wide right and left pulmonary arteries, each measuring 12 mm. in diameter, and by a patent ductus arteriosus, merely 5 mm. in diameter. So far as I have been able to discover, this passage, that of the ductus arteriosus,

was the sole means by which the systemic circulation was carried on, for we shall see that the right or tricuspid ventricle, opening into the aorta, was really a "dummy" pump. If transposition had affected the aortic stems then the aortic arch would have passed over the root of the right lung, and the pulmonary aorta would have been placed to the right of the systemic aorta, whereas (fig. 1, B) they are arranged as in normal right and left sided individuals. Here, then, is a curious result: while all parts of the body, including the auricles of the heart, have been transposed, and also the heart as a whole has been transposed, yet its ventricular and aortic segments are disposed as in normal individuals, except that the systemic and pulmonary aortæ have exchanged origins—an alteration which usually occurs independently of any transposition of viscera.

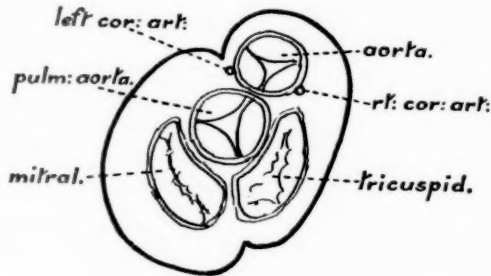


FIG. 2.

Diagram showing the arrangement of the orifices on the ventricular base of the heart.

I have purposely delayed reference to the lungs and pulmonary circulation. A minute examination of the lungs has convinced me that they, too, are transposed, although the evidence for this decision is not apparent at first. The ventral or sternal parts of both lungs are under-developed. The right lung is excavated by the impression for the heart, and is imperfectly divided into an upper and lower lobe, the fissure between the lobes being confined to the ventral part of the lung. The left lung is divided into two lobes; there is no third as in a normal right lung, but the fissure between the upper and lower lobes is a complete one extending into the dorsal aspect of the lung. The root of the right lung has the ramifications of the bronchus and pulmonary artery arranged as in a normal left lung. The left lung, although there is no eparterial bronchus—probably owing to the aortic

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arch passing over the root of this lung—yet simulates in some respects the arrangement seen in the root of a normal right lung.

The arrangement of the pulmonary arteries needs no description; their large size has been mentioned. The veins of the right lung are three in number (fig. 3, B). The upper one from the apical part of the lung joins the innominate vein; it is clear, I think, that it originally opened into the right superior vena cava (compare A, B, fig. 3). The two lower veins of the right lung and the veins from the left, meet and join on the dorsal surface of the systemic auricle—i.e., to the left of the inter-auricular septum, (fig. 3, B): they open together into a separate, or what seems to be a separate, compartment of the systemic auricle. In the normal transposed heart (fig. 3, A) the common termination of

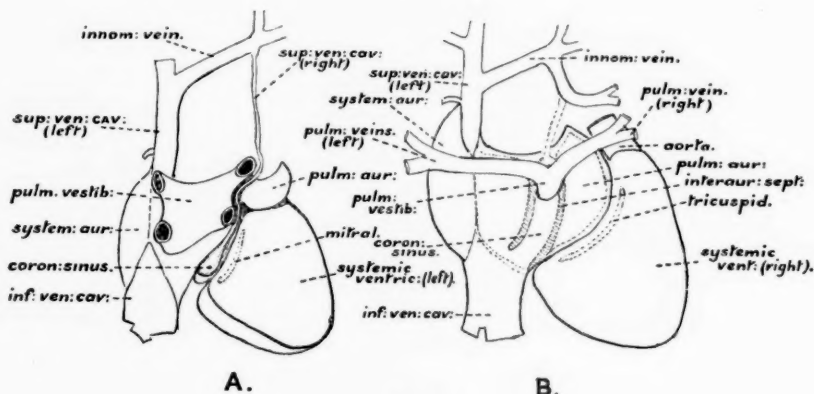


FIG. 3.

To explain the arrangement of the pulmonary veins and pulmonary auricle, as seen from behind. A, the great veins and auricles of a heart in which all parts are reversed. B, the same parts in the case here described. The position of the auricular septum and tricuspid orifice are indicated. The part of the right superior vena cava, which is obliterated in this case, is shown as a stippled outline between the right superior pulmonary vein above and coronary sinus below.

the pulmonary veins becomes expanded to form the large part or vestibule of the pulmonary (left) auricle. It is clear, however, that in this case the pulmonary veins did not open into the auricle—but into that part of the sinus venosus which, in normal hearts becomes reduced to the coronary sinus (fig. 3, A), but here the sinus has become enormously expanded and forms a very considerable part of the systemic auricle

(fig. 3, B). Thus all the blood of the body, both venous and arterial, was poured into the systemic auricle and from there passed into the mitral or left ventricle, which in turn pumped the mixed blood back to the lungs and into the systemic aorta through the ductus arteriosus.

The pulmonary (normal left) auricle is indicated in fig. 3, B. The inter-auricular septum is complete; the fossa ovalis is indicated, but a foramen ovale has never formed. A few minute openings in the septum ovale would have allowed only a small quantity of blood to pass from the systemic to the pulmonary auricle. There are some minute orifices in the pulmonary auricle which may represent openings of cardiac veins. There was practically no blood entering the pulmonary auricle and yet the orifice (tricuspid), leading from this chamber to the corresponding (normal right) ventricle is nearly as big as the mitral orifice on the left side of the heart. That is why I described the right ventricle of this heart as a "dummy" pump, and yet its walls are 6 mm. thick as compared with 8 mm.—the thickness of the left (mitral) ventricle. The cavity of the right ventricle is a flattened space, the wall of the right ventricle enfolding the left and serving as an accessory during systole. All the valves of the heart were normally arranged and formed, save that the semilunar cusps of the pulmonary aorta are harder and more cartilaginous than normal.

Summary.—In this child all the blood from the lungs and from the body was received in one chamber of the heart—the systemic (normal right) auricle. From that auricle it entered the left ventricle, and that chamber served as pulmonary and systemic pump, the only blood reaching the systemic circulation being that which passed into the aorta by a constricted ductus arteriosus. The two other chambers of the heart, the pulmonary auricle and right ventricle, although fully developed, appear to have taken no part in carrying on the circulation.

At the same meeting (November 23) the PRESIDENT (Dr. Voelcker) showed a boy, aged 16, whose spleen had been removed for splenic anæmia.

Dr. WILLCOX showed a similar case in a girl, aged 10.

Dr. HURST and Mr. OSMAN showed two similar cases.

Dr. BENNETT showed a mother and child who had had their spleens

removed for acholuric jaundice four years previously, and a baby born of the mother's second marriage, aged 5 months, who though not jaundiced had a large spleen and considerable anæmia.

Dr. THURSFIELD showed two X-ray plates illustrating the diagnosis of an intra-abdominal tumour with and without oxygen present in the peritoneal cavity.¹

At the meeting of October 26, 1920, the following papers were read:—

F. PARKES WEBER, M.D. "On the Differentiation of the Secondary Forms of Polycythæmia Rubra (excluding merely Transient or Local Increase in the Leucocyte Count) from Erythræmia or Primary Myelopathic Splenomegalic Polycythæmia Rubra." (Published under the title of "The Secondary Forms of Polycythæmia Rubra—Ayerza's Disease, &c.," in the *British Medical Journal*, October 30, 1920, p. 658.)

D. H. PATERSON, M.B. "Notes of a Case of Transient Polycythæmia in a Child."

¹ See J. E. H. Roberts, F.R.C.S., "Oxygen Inflation of the Peritoneal Cavity for Radiographic Purposes," *Brit. Med. Journ.*, November 13, 1920.

Section of Medicine.

President—Dr. A. F. VOELCKER.

Thrombosis of the Inferior Vena Cava and both Renal Veins.¹

By F. PARKES WEBER, M.D.

THE patient, G. G., aged 40, man cook, was admitted to hospital in September, 1920. In the spring of 1919 he had suffered from a septic wound of the right hand. This was followed by an attack of thrombo-phlebitis in the left lower extremity, and at the same time a gradually increasing hydrocele on the left side was first observed, probably (as was later seen) connected with venous obstruction from thrombo-phlebitis in the left pampiniform plexus. On admission in September, 1920 (for permission to publish this portion of the case I am indebted to my surgical colleague, Dr. M. Schroeter) the hydrocele was of considerable size. The right testis was undescended, but could be palpated as a mass about as big as a large walnut on the right side of the lower front of the abdomen. The patient was a small, rather thin man who had formerly had gonorrhoea, but never syphilis. His Wassermann reaction (with the blood serum) had been tried three times, once in 1919 and twice in 1920, and on all three occasions had been found negative. The urine was of rather low specific gravity and contained a trace of albumin; no sugar. Otherwise nothing special was found by ordinary examination. There was no fever; pulse, 72-96; respiration, 22-24 per minute. Brachial systolic blood-pressure (September 9, 1920) 100 mm. Hg. Blood count (September 9, 1920): Erythrocytes, 3,800,000, and white cells, 4,300 per cubic millimetre of blood; nothing special by microscopic examination. The hydrocele was operated on, September 28, 1920.

About October 10, 1920, thrombo-phlebitis in the right internal saphenous vein, accompanied by slight pyrexia, was observed. Some days later, 15 gr. of sodium citrate, three times daily, were prescribed, and a diet containing sufficient green vegetables and fruit. The sodium citrate was, I understand, continued for only three to four weeks.

On November 12, 1920, I noted that the patient was up and about in the hospital, and that there had been no fever since October 19. The superficial veins in the front of the abdomen and thorax were distinctly dilated, more especially on the left side. I thought that there must be some thrombotic obstruction in the great veins of the trunk, probably in the inferior vena cava. The circulation in the dilated veins was from below upwards. There was a slight tendency to œdema of the lower extremities. On November 25 I heard that there had been thrombo-phlebitis in one of the superficial veins on the left front of the abdomen. On November 28 there was a little temporary fever.

On December 3, 1920, the patient was transferred to my care on the medical side of the hospital. For the last three days he had passed very little urine. I thought he might have thrombotic obstruction in one or both

¹ At a meeting of the Section, held March 22, 1921.

renal veins. There was no definite ascites, but the abdomen was rather "full" (? venous engorgement). On December 3 the daily quantity of urine was charted as only 200 c.c. A sample was of specific gravity 1012, acid, free from sugar, and practically free from albumin. Brachial systolic blood-pressure (December 5): 165 mm. Hg. On December 6 I noted that the patient had had considerable pain in the lumbar-sacral region of the back during the last week, and that he had suffered much from headache during the last fortnight. Since December 3 he had apparently passed no urine at all, and it seemed clear that this anuria was due to thrombotic obstruction in both renal veins. At midday on December 6 I ordered him to have a subcutaneous injection of a sterilized solution of 2 grm. urea in 10 c.c. water. At 5 p.m., after a hot hip-bath, he passed about 30 c.c. of pale yellowish urine, containing a little albumin. On December 7 a solution of 4.2 grm. urea was injected subcutaneously, and at 4.30 p.m., after a hot hip-bath, he passed about 12 c.c. urine. The urinary bladder was not distended. During the night of December 7-8 he again passed about 12 c.c. urine (containing a little albumin). No further urea was given, as the patient complained that the injections hurt him, but he was treated by hot hip-baths. About this time there was occasional vomiting. On December 9 I noted that he had passed 60 c.c. pale urine (specific gravity 1013), containing a little albumin. Mentally he seemed quite normal and happy. On December 10 I noted that he had passed 83 c.c. of similar urine, and that the brachial systolic blood-pressure was 155 mm. Hg. It seemed that a collateral circulation through the blood-vessels in the capsules of the kidneys was being established. On December 11 I noted that he had passed 107 c.c. urine (of similar character). He had had a little vomiting, and a short epileptiform attack lasting about five minutes, with definite unconsciousness. On December 11 the hip-baths were discontinued, as patient said he felt too weak to have them. On December 12 I charted 86 c.c. urine, and on December 13 1,000 c.c. (containing only a trace of albumin). The superficial veins of the collateral venous circulation on the trunk were becoming more dilated. There was dullness to percussion at the base of the right lung, apparently due to pleural effusion. Afterwards a little dullness was noted at the base of the left lung also. By December 14 the daily output of urine had reached 1,500 c.c. On December 15 the patient was again ordered to take sodium citrate, 15 gr., three times daily. Brachial systolic blood-pressure (December 15), 140 mm. Hg. By December 16 the daily quantity of urine had reached 2,000 c.c. (containing a trace of albumin). On December 17 Dr. C. Markus kindly made an ophthalmoscopic examination, and found nothing definitely wrong in either fundus. The dullness to percussion at the base of the right lung was not very great. On December 20 I noted that the superficial veins over the back of the trunk were collaterally dilated as well as those on the front.

At the end of December the patient had an attack of herpes zoster of the right lower extremity.

On January 7, 1921, he was passing about 2,250 c.c. urine in the twenty-four hours. The urine contained a trace of albumin, and microscopical examination of the centrifuge-sediment showed some granular and cellular tube-casts and white blood-cells. There had been no fever since November 28.

On January 11 the patient began to get up a little in the ward. On January 24 there was still a moderate degree of dullness at the base of both lungs, more marked at the base of the right lung. Brachial systolic blood-pressure (January 22): 90 mm. Hg.

Since then the patient's condition has remained about the same. There

have been three transitory epileptiform attacks, two in February and one in March, evidently not of uræmic origin. He is (March 8, 1921) passing about 1,450 c.c. urine in the six hours. The urine (March 23) is of specific gravity 1,015, yielding a "cloud" of albumin and containing a few granular tube-casts; no sugar. There is still slight dullness to percussion at the base of both lungs behind. The accompanying illustration (from a photograph taken on March 2, 1921) pictures fairly well the dilated superficial veins of the trunk (see figure).



REMARKS.

Thrombotic obstruction in the inferior vena cava and renal veins, as is well known, occasionally occurs in cases of malignant tumour of the supra-renal glands, the kidneys, or the liver. In such cases there is extension of the growth ("tumour-thrombosis") through the renal vein into the inferior vena cava,¹ and owing to the cause of the thrombosis the termination is necessarily fatal. But it is with the cases of thrombotic obstruction of the inferior vena cava not connected with any malignant tumour that we are now concerned.

¹ Cf. F. Parkes Weber, "Bilateral Hypernephroma, with Secondary Thrombosis of the Inferior Vena Cava and Terminal Uremia," *Proc. Roy. Soc. Med.* 1915, viii (Med. Sect.), pp. 6-10; also F. P. Weber, "Two Cases of Primary Carcinoma in the Liver, in one of which Thrombosis of the Inferior Vena Cava occurred," *Proc. Roy. Soc. Med.*, 1917, x (Clin. Sect.), pp. 30-36.

The thrombo-phlebitis in these cases may follow traumatism, or some infection, such as typhoid fever, scarlet fever, varicella, erysipelas or, as in the above-described case, a septic wound. In such cases the patient may recover and live for a long time, but not very much is known as to the exact subsequent history and the average duration of life. Sooner or later a special liability probably develops to attacks of thrombo-phlebitis in the enlarged (varicose) veins. For instance, in 1907, I saw a man, aged 26, whose inferior vena cava had become thrombosed seven years previously as a sequel of typhoid fever contracted during the South African War. The thrombosis was associated with the usual oedema of the legs and compensatory enlargement of superficial veins. In six weeks' time from the first signs of the thrombosis the dilatation of the veins in the front of the abdomen had already reached its maximum. Since then he had had three attacks of thrombosis in the left lower extremity and had had "varicose" ulcers and pigmentation of the legs. This man's condition was, according to what I heard, much the same in 1912 as when I saw him in 1907.

A case of traumatic thrombosis of the inferior vena cava was shown by Dr. J. L. Bunch at the Royal Society of Medicine on June 18, 1914,¹ but only on account of a probably merely coincidental association with psoriasis. The patient was a man, aged 33, who three years previously, after over-exertion in running, suffered from oedema of the legs and developed collateral enlargement of the superficial veins of the abdomen and groin.

On April 23, 1903, I examined an active, fairly muscular energetic man, aged 28½, for life assurance. The only point against him was that the superficial veins of the lower extremities and the lower part of the trunk were enormously enlarged, doubtless a compensatory enlargement resulting from traumatic thrombosis of the inferior vena cava. The history was that about five years previously, after a carriage accident, his lower limbs became greatly swollen and then the superficial veins of these limbs and of the lower part of the trunk began to enlarge. He was kept five months in bed altogether. Otherwise the applicant appeared in good health and free from disease, and a notable point (in regard to the extent of the thrombosis) was that his urine was free from albumin. His life was accepted for a whole life policy, with ten years extra, and on May 8, 1917, I ascertained through the kindness of Dr. A. T. Davies, that the insurance policy was still in force and that the insured man was about to pay his *last* premium.

A case analogous to the last-mentioned one—but more remarkable and instructive, inasmuch as there was ultimately a post-mortem examination, at which both renal veins were found to have been obliterated—was that of a distinguished member of our profession, who suffered from traumatic thrombosis of the inferior vena cava, when, at the age of about 24, he was house-surgeon at Addenbrooke's Hospital, Cambridge, in 1884. When I was a medical student at the University, he had shown me the great enlargement of the superficial veins in his own case, and it was owing to my knowledge of his case that I ventured to recommend the life in the last-mentioned case for assurance. The whole history of this physician's case has been published by Professor S. G. Shattock in the *Proceedings of the Royal Society of Medicine* (1913, vi, Pathological Section, p. 126), because the patient himself (the late Dr. W. Rivers Pollock), owing to the remarkable circumstances connected with the illness, bequeathed the affected parts of his body, for dissection,

¹ J. L. Bunch, *Proc. Roy. Soc. Med.*, 1914, vii (Sect. Derm.), p. 257.

to the Royal College of Surgeons of England. When the thrombosis occurred (1884) he was in perfect health and won the 120 yards hurdle race for Cambridge University against Oxford, in the record time of sixteen seconds, holding his breath through the whole race. Immediately after the race was over he lay on the grass, and within a few seconds complained of pain in the lumbar spinal region. He was kept in bed for six months. The œdema of his legs and lower part of the trunk which at once supervened was followed in a few days by progressive enlargement of the superficial veins. Albuminuria, which likewise appeared at once after the injury, persisted throughout his life—a life of distinguished professional activity. Death occurred twenty-five years later (October 5, 1909), from tonsillitis and septicæmia. During the last six years of his life he had been subject to attacks of thrombo-phlebitis in the enlarged saphenous veins. Professor Shattock found that the inferior vena cava was converted into a flat, impervious ribbon, from the point of entry of the hepatic vein downwards; both right and left renal veins were closed at their entrance into the vena cava, so that the return of blood from the kidneys must have taken place through the veins of the capsule and thence by way of the lumbar veins through the azygos vessels. Professor Shattock argues that the thrombosis was probably secondary to the rupture of the inner coat of the vena cava caused by the violent strain of the race with the holding of the breath; he compares the venous condition in question (for which he suggests the name "dissecting varix") to the arterial condition known as "dissecting aneurysm," when owing to some violent strain or previous disease a rupture of the inner coat of the aorta has occurred.

Addendum (April, 1921).—The patient, G. G., afterwards began to complain of pain in the lower part of the back and the left thigh, and then in both thighs. His general feebleness increased. Brachial systolic blood-pressure (April 15): 95 mm. Hg. The urine diminished in quantity, and on April 16 he fell into a semicomatose condition, which lasted till his death at 3.30 p.m. on April 17, 1921. The necropsy showed that what I supposed to be the right (retained) testis was a partially softened white tumour, apparently enclosing remains of a testis. This tumour was continuous with a large mass of white retroperitoneal tumour (infiltrated and fused retroperitoneal lymphatic glands), extending upwards beyond the diaphragm. This, doubtless, gave rise to the dullness on percussion over the bases of the lungs noted during life. The tumour-mass (which was softened in some places) involved the great blood-vessels at the back of the abdomen, and more or less included both kidneys and suprarenal glands and the pancreas. It was adherent to the cæcum, the duodenum, the liver, and the periosteum in front of some of the lumbar vertebrae, and doubtless accounted for the pain in the back and thighs complained of during life. The kidneys were both somewhat hydronephrotic, the right more so than the left. The pancreas was compressed. At the time of the necropsy the inferior vena cava was apparently removed with the great retroperitoneal tumour-mass for further investigation, but on later examination was not recognized in it, though the abdominal aorta was easily found in it, completely surrounded and constricted by the growth, which was adherent to its outer coat. From a comparison with other cases it is probable that the inferior vena cava (up to the entrance of the hepatic veins) and the renal veins were blocked by "tumour-thrombosis." The inferior vena cava may then have become merged into the general mass of partially softened new growth. Microscopical sections were prepared (1) of a piece from what seemed to be the

primary growth connected with the right (undescended) testicle, and (2) a piece of the wall of the abdominal aorta with tumour attached to its outer coat. Dr. Cavendish Fletcher's report on the *first piece* was that it was a highly cellular growth, and that the cells were large spheroidal ones with relatively large nuclei. The cells were closely packed in alveolar masses in a very scanty stroma. The growth was of the usual type of malignant neoplasm of the testis, which he (Dr. Fletcher) called carcinoma. The *second piece* showed infiltration of the outer layers of the aortic wall by the carcinoma; there was, in addition, some atheroma.

In connexion with the case being one of primary carcinoma of the undescended testis—that is to say, a "malignant seminoma"—it should be mentioned that no tumour (metastatic) was discovered anywhere else, excepting in connexion with the retroperitoneal lymphatic glands and lymphatics, and by direct extension from the retroperitoneal conglomerate mass, as notably in the right kidney.

Section of Medicine.

President—Dr. A. F. VOELCKER.

DISCUSSION ON ARTIFICIAL PNEUMOTHORAX.¹

Dr. CLIVE RIVIERE

said that it was now some thirty years since Artificial Pneumothorax had come into practical use in the treatment of pulmonary tuberculosis. During this period the roll of its adherents had steadily increased as its value had become more and more widely recognized, and the opposition which new methods always had to encounter, and which in this case had never been very strenuous, appeared to have died down or disappeared. At the present time the treatment was practised in most of their Sanatoria, and in London the County Council had arranged to supply it to patients of the hospital class. As to the opposition it had encountered—such opposition as he had observed had shown itself rather in a studied neglect of the method than in open antagonism; among those who had really investigated and practised the treatment he had neither met nor read of opposing opinions as to its value. This unanimity among the initiated was remarkable, for it was a treatment that involved no small amount of art and judgment, as well as some knowledge, and the success achieved might be expected to differ widely, in the hands of various operators. If there had been any persistently “unlucky” centres their fame had never reached his ears in this connexion and it was important that the class of case treated be taken into careful consideration before any judgment was passed on results.

Those who reserved the treatment for advanced and otherwise hopeless patients might well find ill-fame in spite of the utmost skill—on the other hand, those who treated early cases by pneumothorax would achieve a success which they in no way deserved. The peculiarly individual character of each pneumothorax case, both as to the nature and amount of disease, and the varying features of the “gas pad” applied defeated all efforts to classify the results; those who wished to convince themselves must do so in individual cases. The return to health of a single case of advanced unilateral disease under pneumothorax treatment would have an effect on their minds which statistics would neither increase nor diminish. He would not, therefore, waste time now over the results, as he felt that he would open the discussion more usefully by inviting their remarks and criticisms over a wider field. If they achieved the best possible in selection of cases, and in the art of their treatment, they might safely leave the results to win a steady recognition for themselves.

Indications for Treatment.—The prime essential to success lay in the proper selection of cases. There must be excluded on the one hand those who could recover by other means, and on the other hand, those for whom a pneumothorax would merely mean acceleration of their inevitable end.

¹ At a meeting of the Section, held May 21, 1921.

Forlanini's dictum could perhaps, hardly be improved upon. "Pneumothorax" he remarked, "is indicated every time that life is threatened by the extension of a local lesion." This was not saying, of course, that all such cases were suitable, since contra-indications might exist, but in all such cases the question of a pneumothorax demanded investigation. In practice it was surprising how many cases with disease of the whole of one lung turned up for this treatment. This was not, he was convinced, as a rule, due to the negligence of physicians, who had allowed disease to spread from apex to base before they awoke to the need of doing something. But disease in these cases was of hilum origin, had progressed in the deep parts of the lung, and on reaching the surface was soon evident to auscultation over the whole of one side. In such patients the X-rays would often reveal advanced disease of the opposite lung also, though to the stethoscope it might appear quite sound because the process had not yet reached the surface. For this reason it was imperative, where at all possible, that a radiogram be taken before a pneumothorax was embarked upon, for above all other considerations the condition of the other lung was the point of the most moment. How much disease might be permitted in the other lung without its forming a contra-indication to pneumothorax was a matter which could not be described on paper, and was often very difficult to decide upon in practice. In his experience the question of activity was of far greater importance in this decision than extent or locality of disease. The other lung was rarely altogether free of disease, unless in pneumonic cases, and in these, nevertheless, the prognosis was bad. But torpid lesions, even of wide extent, might be expected to clear up or improve—the strain of increased function seemed to be more than counterbalanced in these cases by the removal of focal reactions and toxæmia, and the effects of the hyperæmia which was probably brought about. Active lesions on the other hand tended to spread and get worse. But even to this there might perhaps be exceptions. Many writers, notably to his recollection, Mary Lapham, and Parfitt and Crombie, had recorded improvement and recovery under pneumothorax in cases in which the other lung was so bad as to appear to be a contra-indication. In some of these the X-rays had not been used till after the pneumothorax had been initiated, and the writers were therefore inclined to discount the X-ray findings somewhat in deciding on the suitability of a case. Nevertheless, the X-ray must be their stand-by, and if they were to extend their field of treatment to cases of more doubtful suitability it could only be through increased experience of the radiological appearances.

Conducted Râles.—One of the warnings he would utter while speaking on selection of cases, was against mistaking conducted sounds for evidence of disease in the better lung. Sharp consonating crepitations were nearly always audible on the opposite side near the spine, and not infrequently about the axilla, though curiously enough they might be less plainly heard, in some cases, in the area between these points. A pneumothorax would often unexpectedly remove sounds in the functioning lung, and frequently, he was sure, these sounds had been merely conducted. Crepitations at the base or round the heart on the good side were not always, he thought, a contra-indication to pneumothorax, where the X-rays showed only quiet peribronchial disease. Such signs might clear as treatment progressed. In cases in which the better lung was of doubtful reliability, a waiting period of complete rest might improve matters—but in other cases the chance of doing a pneumothorax might, through waiting, pass by and be lost.

Intervals and Quantity of Gas.—To pass over the initial operation, of

which he had nothing new to remark, and to come straight to the continuation of a pneumothorax already induced, he would refer to the intervals between refills and the quantity of gas it was wise to introduce. He found a tendency in this country to give larger fillings, and hence at longer intervals than were advised by the most experienced Continental authorities. For example, Forlanini, in Italy, recommended only 200 to 300 c.c., rising at most to 500 c.c. at each filling. Dumarest, in France, rarely left longer than three weeks between refills, unless in cases of thickened pleura; Brauer and Spengler, in Germany and Switzerland respectively, advised 400 to 800 c.c. In this country fillings of 1,000 c.c. or more seemed to be approved of, and one authority was teaching, he was informed, that the intervals achieved should be one month in the first year, two months in the second year, and three months in the third year of treatment. This had led, in one case, he believed, at least, to the need for two refills on consecutive days before the pneumothorax could be re-established at its former volume and pressure. Such a release of collapse seemed very undesirable, and was condemned on grounds of post-mortem experience by some of the best authorities. Personally he had found that it was not possible to fix any standard interval between refills, but each case must be a law to itself. For it might happen in one case that a weak mediastinum prevented their achieving complete collapse of the lung, with the result that gas absorption was rapid, and the intervals had to be short, as in a case of his (Dr. Riviere's) who could at most achieve a two and a half weeks' interval in the fourth year of treatment; or, on the other hand, pleurisy might early limit absorption and permit of long intervals even near the outset of treatment—as in another patient whose pneumothorax had been started only last July, and who had received but 1,120 c.c. of gas, in two refills, since November last. In his experience it was not wise to let refills run above 700 to 800 c.c., and in most cases 500 c.c., or even less, was a preferable amount. The selected quantity would of course determine the interval, and this would be long or short according to the rate of absorption. But, quantity of gas apart, a long interval might allow of expansion and attachment of an imperfectly collapsed lung, as had happened in the case of weak mediastinum already quoted. This patient had been persuaded on one occasion to lengthen his interval to one month, with the result that the lung had become adherent to the chest-wall in two places. The doctor who had made this recommendation had been unaware that the lung, though out of reach of the stethoscope, was but imperfectly collapsed at such pressure as could be used, a fact which was only revealed to X-ray examination.

Pleural Sclerosis.—There was no doubt that the X-rays were a well-nigh indispensable adjunct to treatment, alike in the fixing of the optimum pressure at the outset, and also in the readjustment of this at intervals during the course of treatment. In process of time, even apart from the occurrence of definite pleurisy, the pleural layers underwent a chronic inflammatory thickening, followed by contraction, and the mechanical conditions in the chest were thereby altered. Where the heart had been pushed far over to the opposite side, it might be seen to return towards the pneumothorax, and therewith the lung might show a tendency towards re-expansion. Under these conditions the interpleural pressure must be steadily raised, or heart and lung would become attached to the chest-wall and treatment be interfered with. This readjustment of pressure was a point which must be constantly kept in mind as treatment progressed. In some cases of pleural thickening, and particularly after purulent pleurisy, no amount of pressure would prevent gradual

closing up of the cavity and re-expansion of the lung. In such patients, nevertheless, the expected disaster did not always take place, for the pleural fibrosis might spread through the lung itself, and healing thus be brought about.

Weak Mediastinum.—Another side to the problem of intrapleural pressures was that concerned with weak mediastinum and with "ballooning" of the pleura. Mediastinal overdisplacement might be difficult to discover without X-ray examination, for the manometric signs described by certain writers (slow rise of pressure with stationary points and small fluctuations) were not of much value, the symptoms might be vague, and the position of the heart might not appear to be unduly altered. As a matter of fact the same amount of displacement might be borne without discomfort in one patient, and yet cause marked symptoms in another. The symptoms might amount to vague discomfort, with ill-defined distress, and inability to sleep, or pseudo-asthmatic symptoms might appear with dyspnoea, an audible wheeze, and attacks which might be of a very alarming character. All these symptoms disappeared as soon as their cause was recognized, the pressure lowered, and the mediastinum allowed to recover its tone. In these cases, and in some others in which the displacement was less striking, crepitations might appear at the opposite base, and continue for months or years. They were an indication for a lowering of pressure, but such lowering might be impossible without allowing the lung to expand. Where the signs had, from necessity, been allowed to remain, he had not seen any harm result from their presence. They represented presumably an oedema of the lung-base in most cases, but in some the dryness of the sound, and its appearance or increase immediately after a filling, suggested mere atelectasis as the explanation. In two of his cases, also, he had experienced a definite lung oedema with frothy sputum during the early stages of treatment owing to circulatory embarrassment in the better lung.

Inflamed Pleura and its Treatment.—A condition which seemed to tempt operators to a raising of pressure, always he was sure to the patient's harm, was the onset of pleurisy. This was illustrated by a chart, among many he had seen, which had come under his notice a few days back. At the sixth injection the pressure had been raised for the first time to the modest amount of $-3 + 2$; four days later fluid had been found and the pressure was $+1 + 8$, and yet 40 c.c. of gas had been put in, and the pressure raised to $+3 + 9$; at a later stage in the same case a return of fluid was noted, and the same increase of pressure instituted, though it had been kept low in the interval. He did not regard this as a rational procedure, but agreed with Continental observers that they should hold their hand, and even avoid puncture altogether, during the earlier stages of pleurisy, since such interference might aggravate the inflammation. Moreover, it might lead, as he had seen in these cases, to troublesome displacement of the mediastinum. Fortunately, there was no need for puncture during the early stages of a pleurisy since gas absorption almost ceased, but it was, apparently, the small amount of gas which could be put in that tempted those who did puncture to raise the pressure. The loss of resilience due to inflammatory congestion must not be confused with the stiffness of chronic thickening, in which condition, of course, high pressures could and should be employed.

Ballooning of Pleura.—"Ballooning" of the pleura towards the healthy side at certain weak spots, and particularly in front under the sternum between the first and fourth rib articulations, was of quite common occurrence, but it had not attracted a large amount of attention. It was revealed by the physical

signs of a gas pocket, and was generally seen under X-rays as an elliptical encroachment on the healthy side with a visible sharp border. So far he had seen no harmful results accompany this occurrence.

Surgical Treatment of Adhesions.—The surgical treatment of adhesions and especially of adherent pleura was a subject of the greatest moment, as it promised to open a doorway from pneumothorax treatment into wider fields. Localized adhesions, if solitary or few, could be divided, without opening the chest, by the galvano-cautery, or with a tenotome. Jacobaeus's method consisted in the introduction of an instrument called the thoracoscope, with which the adhesions were visualized, and, thereafter, the introduction of a cannula in the neighbourhood of the adhesion, which was severed by a galvano-cautery introduced through the cannula. The technique was difficult, but a good deal of success had attended its use in skilful hands, as might be gathered from an article by the Norwegian writer Holmboe in *Tubercle*, October, 1919. Division of adhesions with a tenotome had been practised by Morriston-Davies in this country, the operation being carried out under the X-rays. For cases in which a few strong adhesions were preventing treatment one or other of these methods might succeed; with multiple adhesions, opening the chest might probably prove a more satisfactory procedure. About a year ago, in the case of a private patient for whom he had produced a pneumothorax the lung had failed to collapse adequately owing to the presence of numerous firm adhesions to the chest wall. Persistent low pressures had not led to their stretching or separation, and higher pressures had been barred on account of the presence of large and numerous cavities which he had feared might be torn open. Recently the condition had been becoming less and less satisfactory owing to further shortening of the adhesions as the result of chronic pleural inflammation and fibrosis. Some two weeks back Mr. Romanis at his request had opened the chest wall through the third space and divided, with scissors and galvano-cautery, seven strong adhesions, mostly rounded bands, but one with a fairly wide attachment. This had allowed the lung to collapse, which it had done to a moderate degree only, being solid with disease. The actual operation had taken twenty-three minutes, had been done under gas and oxygen only, and no rib resection had been contemplated or performed, an ample opening being obtained between the spaces with special retractors. The operation had led to very little reaction or other disturbance, except for the expected temporary increase of sputum. A refill had been given on the seventh day and again on the twelfth, and all seemed well save for doubts as to the ultimate behaviour of the functioning lung.

Separation of Adherent Lung.—Of recent years the separation of lung adherent to the chest wall over a large surface had been attempted on various occasions. In 1918 Professor Schottmüller, of Hamburg-Eppendorf, had described how he advised the trial of this for a case in which Jessen had found the pleural surfaces adherent. Jessen had refused to attempt it, but Sudeck had removed most of the fourth rib, and separated many adhesions by hand, and a good result had been recorded. Eden, of Jena, stimulated by this, had operated on a case, but had found the surfaces very difficult to separate, and had to confess that the pneumothorax obtained was only partly intrapleural. Some days later the patient had ruptured a lung cavity during the act of coughing. Ulrici had also treated a case by this means, but the operation lasted one and half hours, and the patient had succumbed eventually to extension of disease in the opposite lung, and other organs.

The separation of adherent pleura apart from well defined bands, by surgical means, was not a sensible proposition, but fortunately there appeared to be other possibilities.

Stripping the Costal Pleura: Tuffier's operation.—Just a year ago, he had got Mr. Romanis to strip the parietal pleura from the endothoracic fascia over the apex (apicolysis) in a private patient who was suffering with a bleeding cavity, and to pack the resulting space with solid paraffin. He had been so much impressed on this occasion with the ease with which the parietal pleura stripped, and with the comparative mildness of the operation, done under gas and oxygen, and without rib resection, that he had felt encouraged to try it in other cases in which adherent pleura prevented the production of pneumothorax. Not long after this he had come across a paper by Rieckenburg (working under Ulrici at Sommerfeld) with a description of two cases of adherent lung in which the costal pleura had been stripped from the chest-wall, and a pneumothorax maintained outside it. Rieckenburg pointed out the value of the double covering over large cavities in diminishing the danger of perforation, and noted that the raw pleural surface in healing contracted downwards and prevented further expansion of the lung. The cavity held gas only under low pressures at first, but eventually it became effectively "gas-tight."

Encouraged by the possibility this offered, he (Dr. Riviere) had asked Mr. Romanis in January last to strip the whole costal pleura in a case eminently suitable for pneumothorax, but with total adhesion of the pleural surfaces. The patient had chronic disease of the whole right lung with cavitation, with fever and a temperature running to 100.5° F., in spite of prolonged rest. The left lung was an excellent organ. The chest had been opened through the third space, and the pleura separated with the hand over all but the inner surface of the lung. Ample room for insertion of the hand between the ribs had been obtained by strong retraction, and the pleura stripped with the greatest ease, but the lung had collapsed little, as it was solid with disease. The operation had lasted but twenty minutes, and had been followed by very little shock or reaction. It had been realized that the absorption of air would be rapid, but he had thought a week could be left before the refill. Most unfortunately, however, the patient had only come into his hands again after an interval of twelve days, and by then all the air had been found absorbed, and the lung re-expanded. It would be wiser, in such a case, to leave a small opening to the outer air, and to close this at the end of a week, when refills could be conveniently substituted. The sequel in this case had been interesting, for the temporary immobilization of the lung had allowed the patient to re-establish tolerance, and the temperature had fallen to 99° F., and had remained there; at the same time both lung and general condition had improved. This improvement was reminiscent of some experiences of Schroeder, who had found lung fibrosis and recovery followed a severe traumatic pleurisy in three cases in which he had attempted, without success, to separate adherent pleural surfaces after a pneumothorax operation by Brauer's open method.

Extrapleural Thoracoplasty.—He had referred to the possibility of thus creating and maintaining an extrapleural pneumothorax because the idea might be new to some of those present. He would leave others to speak of the better recognized means of dealing with adherent pleura, by extrapleural thoracoplasty, under local anaesthesia. Two admirable papers on this subject by Scandinavian authorities had appeared last year, one in *Tubercle*, April,

1920, by Saugman, dealing with forty-one cases, and one by Bull of Christiania in the *Lancet* of October 16, 1920, with an account of thirty-seven cases. The results appeared to be excellent, and the actual operation mortality small, amounting to but four cases in each series.

With regard to all these surgical procedures, it must be noted that operations were not to be lightly undertaken on the subjects of pulmonary tuberculosis; the cases required even more careful selection, especially as regarded the condition of the better lung, than they did for mere pneumothorax treatment.

And before leaving the subject of adherent pleura he would insist that no operative measures must be undertaken for its relief until its actuality was determined by experiment. It might well be supposed that where a great displacement of organs and closing in of ribs had occurred, they were then necessarily dealing with adherent pleura. But this was by no means the case, and to illustrate the fact he exhibited the radiogram from a patient on whom he had induced a pneumothorax some three weeks ago. The heart was entirely in the right chest, and the trachea drawn over and distorted, and yet the pleural surfaces proved un-adherent with the result, as would be expected, that the intrapleural pressure had fallen to a very low figure—actually to -27 – -25 cm. of water.

Perforation of the lung was a complication of pneumothorax about which much had been published within recent years, and he hoped any present who might have personal experiences of this accident would relate them, for it was a very interesting subject, particularly from the point of view of treatment.

Pneumothorax treatment was a big subject because it involved so many possibilities; he would finally insist on the comparative narrowness of its indications, but its striking hopefulness within these limits. All was possible to a case of unilateral, or practically unilateral, disease, if only they were persistent. It was for that reason he had discussed surgical interference, feeling that the occurrence of adherent pleura was no excuse for abandoning treatment. The patient with one lung had a good fighting chance under treatment carried out with skill and resourcefulness.

Sir JAMES FOWLER

described a case which had come under his notice in 1885, when artificial pneumothorax was induced in a youth aged 21 for hæmoptysis. The patient had been in hospital for thirty-one days, and during severe attacks of hæmoptysis 196 oz. of blood were brought up. After the pneumothorax the patient had two attacks of hæmoptysis during the five remaining days he lived, during which 4 and 2 oz. of blood were coughed up. Post-mortem examination showed the presence of an old cavity at the apex of the left lung from which the blood had come, the upper lobe and the right lung being infiltrated with miliary tubercle. Sir James Fowler considered that pneumothorax was one of the two great advances which had been seen in the treatment of tuberculosis.

Dr. S. VERE PEARSON

said that the more experience he gained the more he felt that too much diffidence was shown in resorting to artificial pneumothorax. He did not however advocate it in early cases. The following two case reports illustrate its value:—

Case I.—A year or two ago he had a male patient, aged 27, under his care, whose general condition had been excellent. He had been quite afebrile; sleeping and eating well; of good body weight; walking eight to ten miles a day; his sputum only very scanty though containing tubercle bacilli. Although he had had signs of extensive disease on one side, and the other lung had been apparently quite free from disease, his condition of health appeared to be too good to lead one to urge treatment by compression. But he had developed severe hæmorrhages and his life was threatened. Dr. Vere Pearson had induced a pneumothorax quite easily. No adhesions had been present, the hæmorrhage had been stopped, and for a few days the outlook had seemed favourable. Unfortunately, however, it had soon become obvious that blood had been aspirated into the lower lobe of the opposite lung. This became congested and the patient had died.

Case II (male, aged 35) had occurred within the last few months. Patient feverish and ill, bedridden for a great many months, with serious bowel symptoms, and the sounder right lung obviously infiltrated somewhat seriously in its upper part. Dr. L. W. Sharp and Dr. Pearson had thought pneumothorax treatment inadvisable, but had called into consultation a well-known physician. He had agreed with this opinion because of the bowel symptoms, chiefly severe pains and offensive, unformed motions for two years, and because of the condition of the sounder lung. A fortnight after the consultation a left-sided spontaneous pneumothorax had occurred. After a few days grave illness rapid improvement had set in, and now, some six weeks later, there had been great improvement. The fever, previously rather high and persistent for over a year, had gone, weight was being gained rapidly, and, most striking of all, there was a good appetite, formed motions, and no abdominal pain.

He corroborated the opinion of other workers as to the impossibility of ascertaining whether or not adhesions were present, by any means short of puncture by the hollow needle connected with a manometer. The form of needle used for an initial operation was unimportant, and he believed in trying the simplest kind first. He had abandoned a great number of punctures when he had failed to find free pleural surfaces, and had given up persistent endeavour by ordinary means when initially only a very incomplete pneumothorax could be produced on account of adhesions. He did not usually try again after two séances with about three punctures at each. Several years ago, when he used to try to tear adherent pleural surfaces apart in cases with extensive adhesions, by repeated doses of gas at high pressure, he had met with the only suggestion of gas embolism he had ever come across in his own practice. The patient had become semi-conscious for a few minutes, and afterwards for several hours had presented partial hemianopia and hemiparesis. With regard to pleural reflex, he had twice encountered alarming symptoms which perhaps ought to be ascribed to this reaction, but the effects produced by a very small initial dose of gas given with all the manometric readings favourable had hardly accorded with those usually ascribed to pleural reflex. The dose had immediately set up most distressing dyspnœa of the asthmatic type. In the first case this had subsided in a few hours. The hopelessness of the outlook unless compression treatment was successful had induced him to make a second effort. But again exactly the same symptom had arisen, and had taken many hours to subside. In the second case the dyspnœa had increased progressively until death, within an hour and a half of a dose of only about 100 c.c. of oxygen. It was only fair to add that in this case gas had been introduced on the advice of a consultant into the side containing the lung with least extensive disease, in the belief that it was this area of disease that was active; the outlook anyhow had been very bad.

In his series of cases of effective compression, fluid occurred about as fre-

quently on one side as on the other, and in partial as well as in complete pneumothoraces. In a total of fifty-six cases, twenty-three had been right-sided and thirty-three left-sided. Of the former, four had been partial; two of these, and ten of the rest had had fluid. Of the latter, seven had been partial; four of these partial cases and fourteen of the complete pneumothoraces had developed fluid at some time or other. One striking point about the cases with fluid, if they were properly handled, was that the ultimate results were but little worse than those following dry pneumothorax. Saugman's figures, published in the *Lancet* (1920, ii, p. 687), were conclusive as to this. There were several points connected with fluid which might profitably be discussed. Though ultimate results in these cases might be but little worse than with dry pneumothorax cavities, the presence of fluid was generally at least a nuisance, and often it added a good many extra problems and difficulties to the management of the case. What were the circumstances which called for aspiration? Did replacement by oxygen instead of by nitrogen or by air lead to quicker absorption? He had come to no final conclusions in either case. A chest full of fluid should be aspirated if possible. Such a cavity should be treated conservatively as long as it was purely tuberculous, and this was almost invariable in these cases; it should not be opened by any cutting operation. When any fever, other than the slightest, persisted for many weeks and seemed to be caused by the pleuritis and the effusion, aspiration should be resorted to, especially if malaise, anorexia, and indigestion were severe. If re-expansion of the lung was difficult to control and the formation of new adhesions seemed imminent, it was best to empty the chest as completely as possible and replace the fluid by gas. Under these circumstances one should not wait long, say, only until the cavity was about one-third to half full, before repeating the procedure. Apart from the foregoing indications he could see no advantages in aspirating the fluid, and he believed aspirations were sometimes undertaken unnecessarily. Whenever he aspirated he tried to get all the fluid off and replaced by gas. Fluid cases naturally required more frequent reference to the X-ray room than dry cases. He was most desirous of learning something more about the various causes of the fluid. Little advantage was to be gained by striving after a precise and elaborate classification of the varying kinds of tuberculous pleurisies which occurred in so many of these cases.

A few words about the means of dealing with adhesions and about future developments. They had much still to learn. In England they were behind the Continental workers in dealing with patients who presented all the indications of successful treatment by pneumothorax, but whose adhesions prevented the possibility of such success. He had been much impressed by Jacobaeus's paper on the cauterization of adhesions by the aid of the thoracoscope and a galvanic cautery. This author had operated by these puncture methods on forty patients with partial adhesions. In thirty out of the forty cases he had been able to accomplish what he had set out to do. In twenty-six cases he had produced a more effective pneumothorax, and thereby benefited the patient. With over 100 cauterizations he had never met with secondary infection, and only once had hæmorrhage arisen. Patients suffered from that incompetence which arose from the hiatus in collaboration between the physician and the surgeon—a gap which must be bridged. On account of purely tuberculous lesions being dealt with in the division of partial adhesions, he (Dr. Pearson) preferred on theoretical grounds those methods in the use of which cutting operations were avoided as far as possible.

Dr. NEVILLE COX

referred to the danger of using a pointed needle for the first operation and to the risk of tuberculin injections in the after-treatment. He thought that a matter of paramount importance to tuberculosis officers and others dealing with large numbers of phthisis cases, especially among the industrial classes, consisted in the indications for the treatment; and that it was also of the highest importance to know whether it was justifiable to use the method in some of the so-called early cases. Dr. Cox pointed out the notoriously bad prognosis in such cases, in which bacilli were persistently present, when treated on ordinary lines. He also referred to the need of competent surgical assistance in some of the complications of pneumothorax, and thought that the larger sanatoria should have properly equipped operating theatres, with surgeons attached, to deal with such cases.

Dr. DONALD HALL

said that artificial pneumothorax was a means of almost certain prolongation of life and return of health to some of their "hopeless consumptives," and to a proportion of these even a complete cure. There must be in this country at the present time hundreds of cases left to die, and not always in a state of euthanasia, because this treatment was denied them. In illustration of the great benefit derived from the artificial pneumothorax treatment he might mention that he had himself seen a woman too weak to walk to hospital, return home and, unaided, manage her house and cook for herself, her husband, and five young children. He had seen another patient arrive at a nursing home in an ambulance—they had had doubts as to whether she could stand even that—and go home to the Midlands unattended; and he had seen yet another patient who for over a year had never left her bed, except for an occasional hour on a couch, out walking within three months.

As regarded details of procedure he had kept to the technique elaborated by Dr. Riviere and Dr. Pearson. The gas he now used was air. On four occasions he had made his first puncture, and each time successfully, with a Lillingston needle. On one occasion, in which a patient had developed an effusion—clear fluid in which Dr. H. M. Galt had failed to find tubercle bacilli—he had given her 1 c.c. of the fluid hypodermically. She was an out-patient and he did not see her again for a week. She said she had passed an extraordinary amount of urine in the interval, and he had found the pleural cavity dry and the lung expanding. He had always kept to low pressures, aiming at obtaining one of + 5. So far he had not met with any serious complication.

Two points needed special emphasis:—

(1) From the medical profession as a whole this treatment had not received the recognition which was due to it. For this neglect, as Dr. Riviere had termed it, there might be several reasons, or excuses. One of these was ignorance. It was fortunate for the community that most of them were cautious in adopting any treatment of startling novelty. But they were apt to be prejudiced, and frequently showed lack of knowledge and want of appreciation of new methods.

A second factor accounting for this want of recognition was lack of material. The well-to-do patients were in private sanatoria or in the hands of one of the very few outside experts, while the poorer cases were in

municipal or other public sanatoria. He had given his latest refill the previous day, but he had not begun with a new case since December. If these patients could obtain their treatment nearer home, possibly they would not go so far afield. He knew two towns, each with a population of a quarter of a million, where as recently as last summer he had found it impossible to obtain refills, nor, when he had appealed to them, could Dr. Riviere or Dr. Pearson help him. With 500,000 population and some 300 doctors, lack of material could hardly be the cause there. A third factor was fear, on part of patients or of doctor, but this need hardly be taken seriously. A fourth and important factor consisted in the strain the treatment put upon patient and physician. To both it was a tie, but this would be lessened on the part of the physician were he able to fall back upon the support of his colleagues.

(2) Cases must be selected with the greatest care. One might be called to a case, recognize it as unsuitable, and be over-persuaded "to give the poor soul a chance; she had nothing to lose." He had made that mistake once in a case, but he would not make it again. After a brilliant opening the inevitable occurred—the other lung gave way. One point about the case, however, had been the occurrence of repeated and severe hæmoptysis—and she never had another attack. They must realize that although the patient had nothing to lose, the treatment had; and until the method was more widely adopted and approved, each avoidable unsuccessful case was an error in tactics on the part of its exponents.

Dr. JANE WALKER

said that at the East Anglian Sanatorium they had first begun to treat patients by this method in March, 1912. They had, up to date, treated 117 cases. Of those cases they had failed to produce a pneumothorax in twelve—i.e., in 10·3 per cent. The cases they had selected had been advanced cases in whom there was little prospect of recovery, which of course had given them a small percentage of "cures." They had induced an artificial pneumothorax in cases in which there was evidence of general toxæmia and in which one lung only was extensively diseased, with a possible small lesion, limited to about a quarter of the other lung. They would not treat a case in this manner if there were extensive disease in the other lung, if there were albuminuria, or if the patient were of a very nervous temperament. A small amount of mischief in the other lung was certainly not a contra-indication, and in a large number of cases, with the general improvement in the patient's condition, a diminution in the signs of the other lung had taken place.

Of their 117 cases, seventy-three had been female and forty-four male. Their ages had varied from 8 to 60. Of these cases, sixteen had been under 16 years of age, twelve girls and four boys; and of these sixteen cases eleven had had tubercle bacilli in the sputum, four had had sputum and no tubercle bacilli, and one had had no sputum. Nine of these sixteen were alive: one who had been treated in 1912, four of those treated in 1915, one treated in 1917, one in 1918, one in 1920, and one was now under treatment at the Children's Sanatorium. Of the remaining 101 cases, thirty-seven were alive as far as they knew; sixteen of these were recent cases, that is they had all been treated since the middle of 1920; eleven of those had a very good prospect of recovery. Sixty-four were known to have died. So that, roughly, two-thirds had died already, and a good many more were likely to follow.

So far they had no serious accidents connected with the treatment:

occasionally a vein had been punctured. They used the simplest possible form of apparatus, the same they had begun with in 1912. The only modification they had introduced was the use, for years past, of air rather than of nitrogen. They had never used oxygen for the initial operation. They prepared the patients by giving them omnopon a couple of hours or so beforehand, and they used novocaine or locæsthetic as a local anæsthetic, taking care to anæsthetize the deeper tissue as well as the skin. They usually inserted 200 to 250 c.c. on the first occasion, increasing the amount to 300 c.c. the next day. Then they left a gap of a day and gave 350 c.c. and so on, gradually lengthening the intervals. It had been their practice lately to give smaller doses at more frequent intervals. Thus they rarely allowed a patient to go longer than three weeks without a refill, and they rarely gave as much as 1,000 c.c. for the first six months or so. They usually finished the first few refills with a - pressure and rarely went beyond +10 later on.

For the past four years they had made X-ray examinations of all their cases, and in common with other observers they had discovered the presence of fluid in a large proportion of cases. They did not think Professor Saugman's estimate of 50 per cent. was far from the mark.

The disadvantages of a large quantity of gas they had found to be breathlessness, too great strain on the other lung, and digestive disturbance—this perhaps more especially with the left lung—fifty right and sixty-five left; in two it was not stated. It was a curious fact how difficult it was to make patients gain weight during their treatment by this method.

Dr. Walker felt very strongly that the time had come for them to consider whether this method of treatment should not be applied to patients before they became so severely ill. In all their cases an artificial pneumothorax had been induced as a last hope, and although the percentage of recoveries was so comparatively low, life for these people had been made far more tolerable, distressing symptoms had been greatly alleviated, and life had been undoubtedly prolonged—so that, as far as her patients were concerned, Dr. Walker felt that the whole proceeding had been well worth while.

Dr. L. S. BURRELL

said that he would refer to two conditions that might arise during the treatment of pulmonary tuberculosis with artificial pneumothorax: (1) The gradual obliteration of the pneumothorax cavity, and (2) the formation of pleural effusion.

Out of seventy-seven cases in which he had produced an artificial pneumothorax and had kept it up for a month or more, in five the air space had gradually become smaller and smaller until eventually it had closed. In one of these the parietal pleura had become much thickened, so that the needle had to be introduced far to reach the air space, but in the other four there had been no great thickening of the pleura.

Case I.—A man, aged 50, who had been under pneumothorax treatment for four months, had been shown by X-ray to have a good collapse but a large adhesion between the lower part of the lung and the chest wall. 1,300 c.c. of air had produced a pressure of +8. Six weeks later 800 c.c. had produced +10. Six weeks later 1,000 c.c. had produced +14. Six weeks later 250 c.c. had produced +13, and after another six weeks there had been no air space at all. It had therefore not been possible to continue the treatment, and now, sixteen months later, there was complete fibrosis of the left lung, the condition of the patient was good, there was no sputum, and he was at full work.

Case II.—A woman, aged 32. After five months' treatment the air space had closed and no more refills could be given. Now, nine months later, her condition was good, she had no sputum, and was leading a normal life. He exhibited two X-ray prints showing her condition during and after treatment, and also the temperature chart during the treatment.

Case III.—A woman, aged 39, had had treatment for fourteen months, and then the air space had become obliterated. Now, sixteen months later, the patient had no sputum and was leading a normal life.

Case IV.—A man, aged 43, had had treatment for twelve months and then the air space had become closed and the treatment could not be continued. Now, after eight months, his general condition was good and there was no sputum.

Case V.—A man, aged 44. After seven months' treatment the air space had become closed. Now, six months later, his condition was good and he had just started work. There had been no more hæmoptysis since the treatment was begun, but there was still some cough and sputum in which tubercle bacilli were still present.

In all these cases the disease had been on the left side, and each patient had been over 30 years of age. Treatment had been started because of repeated hæmoptysis in two cases, and because of progressive disease in spite of sanatorium treatment in the other three.

The pneumothorax had seemed to hasten the formation of fibrous tissue, and all the cases had been much improved in spite of the short time they had been under treatment. Dr. Parry Morgan told him that he (Dr. Morgan) had seen great improvement follow artificial pneumothorax even when the treatment had been stopped after the first refill. Personally he (Dr. Burrell) was strongly of opinion that the treatment should be kept up for at least two years when possible, and he had seen a relapse occur, four months after treatment had been stopped, in a patient who had been having refills for two and a half years.

Out of seventy-seven cases of artificial pneumothorax he had had eighteen cases of pleural effusion, i.e., 22·3 per cent. But he did not include in those seventy-seven cases any case in which the treatment had not been continued for at least a month. In eleven of these eighteen cases the pleural effusion had developed within the first four months of treatment. In another six it had developed before the end of the eighth month, and in one it had developed after nineteen months' treatment. Three of the eighteen patients were dead, three were very ill, but the rest were doing well and seven of them were at work. The fluid often became thick and might contain tubercle bacilli, but no other organisms had been found in his series.

He had noticed that patients from whom the fluid was not withdrawn often did quite well and appeared to be unaffected by the effusion. It was his practice, however, to replace the fluid with air or oxygen once about every three months.

An X-ray print had shown the chest full of fluid. In that case artificial pneumothorax had been started in August, 1918, and fluid formed in February, 1919. After that the patient had had no further treatment until Dr. Burrell saw him in June, 1920, and found the chest full of fluid which had apparently been there for sixteen months; during that time he had been up and about all day, had had no sputum or symptoms except some dyspnœa on exertion. Within a week he had removed 4,700 c.c. of thick greenish fluid and replaced it with air. The fluid had contained cholesterol crystals but not tubercle bacilli and it was sterile. The X-ray print had also shown the mediastinum much displaced to the left. The fluid had quickly re-formed, but after repeated

aspirations had become less and less. A final print had shown the present condition of the chest. His thanks were due to Dr. Stanley Melville, who had taken the skiagrams for the prints.

In conclusion Dr. Burrell spoke in favour of the double manometer, although he himself generally used the apparatus devised by Dr. Lillingston and Dr. Pearson, which had a single manometer. With a double manometer, as found in Dr. Parry Morgan's apparatus, the oscillations were more easily seen, and this was a great advantage, especially at the initial operation. Moreover, with this double manometer, it was possible to see the pressure of the gas from the bottle and the intrapleural pressure at the same time. One could also see by the manometer whether the gas was flowing into the pleural cavity or not.

Dr. STANLEY MELVILLE

pleaded for the routine collaboration of the clinician and the radiologist more in the induction of artificial pneumothorax than in most other things for the following reasons:—

(1) To determine (visually) the distribution of the disease. The skiagram always showed more extensive shadows of disease than were appreciable to the physical examination—he referred more particularly to conditions in which physical signs were definite.

(2) In cases in which there was well-marked disease in one lung, a compensatory emphysema in the "more healthy" lung was speedily set up, and the presence of emphysema unquestionably masked physical signs.

(3) Deep seated disease, especially in an emphysematous lung, almost forbade detection by the ear, even by such experts as those on the staff of a Chest Hospital.

(4) The situation of definite adhesions, and the possibility of indicating the most suitable site for the insertion of the needle.

There were two interesting points he would like to make:—

(a) If a case was systematically watched during the intervals of filling, adhesions were seen, which were unsuspected, and it was most interesting to watch the slow but definite stretching of these adhesions. As the lung became decompressed, these adhesions were seen to shorten, in other words, the lung was decompressed along the lines of the adhesions.

(b) In practically every case of artificial pneumothorax, after a fair amount of gas had been introduced into the pleural cavity, the other lung was seen to become less translucent. Dr. Lucas, of Banbury, in a most interesting little monograph had drawn attention to this phenomenon. Dr. Melville emphasized the conceivable therapeutic value of this phenomenon, for, although some of the lessened density might be due to compression, a hyperæmia was set up, and this, he thought, must have some influence upon any diseased focus in the more healthy lung.

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SECTION OF NEUROLOGY.

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Section of Neurology.

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Aphasia: An Historical Review.¹

(THE HUGHLINGS JACKSON LECTURE FOR 1920.)

By HENRY HEAD, M.D., F.R.S.

THE evolution of our knowledge of cerebral localization is one of the most astonishing stories in the history of medicine. Throughout the Middle Ages the brain was supposed to contain three ventricles, each of which was the dwelling place of one or more aspects of the psyche [19]. The anterior chamber received the nerves of taste, smell, sight and hearing, and was the seat of the "sensus communis"; in the middle ventricle dwelt the faculty of cogitation and reasoning, whilst the posterior one was the seat of memory.

Under the profound influence of Descartes and his followers the vivid intellectual life of the seventeenth and eighteenth centuries swept away all traces of this scholastic materialism. Many guesses were made, but no satisfactory theory was evolved to account for the relation of mind and body; even as late as 1798, Soemmering thought the seat of the soul was in the fluid which filled the ventricles. No one presumed to imagine that the activities of the mind bore any direct relation to the life of the brain. Gall first suggested that this apparently uniform mass was made up of organs which subserved the manifestations of the vital and moral faculties of man. These could be divided into three groups: (1) Those concerned with the exercise of "vital force," which he located in the upper part of the spinal cord and medulla oblongata; (2) the "inclinations and affections of the soul," situated in the basal

¹ At a meeting of the Section, held October 7, 1920.

portions of the brain, and (3) the "intellectual qualities of the mind," associated with the cerebral hemispheres.

We habitually think of Gall with derision, as a quack who was responsible for phrenology and the study of bumps on the head. But it is to this man that we are really indebted for the beginning of the conceptions we now hold of the relations of the various portions of the nervous system to one another.

Franz Joseph Gall was born on March 9, 1758, at Tiefenbronn, in Baden. He studied medicine in Strasbourg, and in 1781 settled in Vienna. From 1796 to the end of 1801 he lectured on a new theory of the functions of the brain. His views were considered so subversive of religion and morals, that on December 24, 1801, his lectures were forbidden by an autograph letter of the Kaiser. Gall seems to have remained in Vienna for the next three years, and then journeyed through Europe with his pupil Spurzheim, lecturing as he went [10]. In 1807 he reached Paris, and in the following year presented a memoir to the Institute of France, entitled "*Introduction au Cours de Physiologie du Cerveau*." On this treatise a committee specially appointed drew up an unfavourable report. Gall and Spurzheim in 1809 published their "*Recherches sur le système nerveux en général et sur celui du cerveau en particulier*," which comprised a categorical examination and reply to the objections of the committee's report [11]. This was their first serious publication in French, and it contains all the views put forward by Gall at one time or another. Subsequently he issued in Paris a full account of his work in eight volumes, with an atlas of a hundred plates [12].

The doctrines of Gall had an enormous influence upon the thought of his time; but the only part of his theory which we attribute to him in the present day is the idea that the underlying structure of the brain has an effect upon the formation of the skull, and in consequence that character could be foretold from the external conformation of the head. But in reality this is but a small part of the theory put forward by Gall. He was the first to insist that the brain should be examined anatomically from the spinal cord upwards; for he laid down that the functions of the brain could only be explained by considering their relations to those of the spinal cord. All nerve fibres ended in grey matter, and the white matter of the nervous system served for conduction only. He pointed out the analogy between the grey matter which covers the hemispheres of the brain and of the cerebellum, with that which forms the corpora quadrigemina and optic thalamus. All

nerves whether they belonged to the brain or to the spinal cord took their origin in grey matter, and the substance of the cerebrum and cerebellum could not be considered to be in direct connexion with the peripheral nerves.

These ideas have been accepted into the body of general knowledge, but they were accompanied in Gall's exposition by the most fantastic theories with regard to the "moral" qualities. He pointed out that injuries to the head showed that the mind was associated with the brain, and that the brain serves as the organ of intellectual life. The nervous system of man was therefore the physical instrument of his moral life, for the nerves were the conductors by which the will was transmitted to all parts of the body. Then he set about to consider in what parts of the brain were situated the various moral and intellectual qualities of man. At that time it was supposed that man was endowed with certain "faculties," and it was these that Gall attempted to localize in different parts of the brain. He found the organ of the generative force in the cerebellum, and those of the five senses over the front portion of the brain. There were six different forms of memory, each of which he localized in a different "organ," or as we should say "centre." There was the memory of things, the memory of locality, the name-memory, the verbal and grammatical memory, and the memory for numbers. All of these were situated in those portions of the brain which lay in relation with the posterior part of the orbital cavity. It would seem that this localization dated back to Gall's earliest years; for as a boy he noticed that his companions who had "*des yeux pochetés*" (prominent eyes) had a gift for languages and a memory for words. He therefore concluded that the parts of the brain which pushed the eyes forward must be associated with the different varieties of verbal memory. Translated into anatomical terms, this meant that the frontal lobes and particularly their under surface must be devoted to these forms of memory.

He appears to have taken no precautions to verify this localization, but he had the opportunity of seeing an officer in whom a foil had passed through the base of the frontal lobes, producing grave disorders of speech. He gives a very short description of this case, but seems to look upon it simply as confirmatory evidence of his theory.

Gall died on August 22, 1828, and gradually most of his views passed into oblivion or came to be treated with derision; but his conception, that speech and the memory for words were situated in the frontal lobes, still found supporters. Its warmest champion was

Bouillaud, who was appointed Professor of Clinical Medicine at the "Charité" in 1831, and at the time that Broca made his first post-mortem, was 65 years old, and the "doyen" of the faculty. He was an ardent follower of Gall, and offered a sum of money to anyone who would produce the brain of an individual who had lost his speech in which the anterior lobes presented no lesion.

In 1861 Broca had just become the head of the Surgical Unit at the Bicêtre. An elderly man was admitted to his wards (aged 51) with a diffuse gangrenous inflammation of the right lower extremity. He was completely aphasic, and died a few days later; Broca demonstrated the brain at the Société d'Anthropologie, of which he was the Secretary [5]. This brain showed destruction of the posterior part of the third frontal convolution and the inferior portion of the Rolandic area. It was preserved in the Musée Dupuytren, and was subsequently examined more carefully by Pierre Marie [16, No. 3], who has pointed out that the lesion also occupied the first temporal convolution and the supramarginal gyrus, parts which at that time were not considered of any importance from the point of view of speech. This was followed by a second case [7] in which the situation and nature of the lesion was acknowledged to be more doubtful (November, 1861). This brain also has been examined by Pierre Marie, who could find no lesion of the third frontal convolution, but there seems to have been some wasting at the foot of the second frontal convolution, which is not uncommon in a senile brain. Broca himself says that this lesion is incomparably more circumscribed than that of the first brain, but he continues, "in comparing the two specimens it is possible to make certain that the centre of the lesion is identically the same in the two cases."

As may easily be imagined, these communications led to the greatest excitement in the medical world of Paris. Bouillaud, and his son-in-law Auburtin, greeted Broca as a convert to the doctrines of Gall. The localization of speech became a political question; the older conservative school clung to the conception that the brain "acted as a whole," whereas the younger liberals and republicans passionately favoured the localization of function. For the next few years, every scientist of importance in Paris took one side or the other. Trousseau brought the weight of his authority into the scale on the side of Broca, and invented the word "aphasia" to replace Broca's "aphemia." This was an unjustifiable change in nomenclature, which as Broca complained "brought back into pathology the very confusion I thought to dissipate."

Broca described aphemia as follows: "There are cases where the general faculty of language persists without alteration, where the auditory apparatus is intact, where all the muscles, without excepting those of the voice and articulation, obey the will, and where in spite of this a cerebral lesion abolishes articulate language; this abolition of speech in individuals who are not paralysed or idiots, constitutes a symptom sufficiently singular to be given a special name. I shall give it the name of 'aphemia' because what is wanting in these patients is solely the faculty of articulation. They hear, they understand all that one says to them; they have their intelligence, they can emit vocal sounds with ease; they can execute with the tongue and cheeks movements much more energetic than those required for the articulation of sounds. Moreover, the answers they can make are reduced to a very few articulated sounds, always the same and always disposed in the same manner. Their vocabulary is composed of a short series of syllables, sometimes of a monosyllable which expresses everything, or rather it does not express anything, because the single word is often foreign to all vocabularies. Some patients have not even this vestige of articulated language; they make vain efforts without pronouncing a syllable" [6].

Broca had discovered a definite clinical condition, which he called "aphemia," produced by destruction of the substance of the brain, and he believed that he had found the seat of the faculty of articulated language in the third frontal convolution.

Interest in the question of localization of speech rapidly spread to England, and in 1864, Hughlings Jackson published his first paper on "Loss of Speech with Hemiplegia of the Left Side" [14, No. 2]. This was followed by a series of contributions on the subject in which many other physicians joined.

In 1868, the British Association for the Advancement of Science, held its Annual Meeting at Norwich, and M. Broca opened a discussion on aphasia. He was followed by Dr. Jackson. No record of these contributions are to be found in the *Proceedings of the British Association*, but Broca's paper was published in the *Tribune Médical* [8].¹ An abstract of Jackson's paper appeared in the *Medical Times and Gazette* for September 5, 1868. This has been reprinted amongst the collected papers in *Brain* [14, No. 17].

¹ I was unable to find this paper in London and owe my knowledge of its contents to the kindness of Professor Pierre Marie, who caused a copy to be made by hand. This he presented to me in memory of his master, Broca, for whom he acted as Interne in 1890.

Thus, we are able to compare the views of the French and English protagonists of localization, and it is no wonder that at that period, and, under those conditions, Jackson's views produced little serious effect. Broca is clear, definite and precise, and I shall therefore begin this stage of the history by summarizing his views.

He divides affections of speech of central origin into two main groups—"Aphémie" and "Amnésie Verbale," and lays down clearly the difference between them. The aphemic patient has a profoundly reduced vocabulary and may be speechless, except for some monosyllables, oaths and words that do not seem to belong to any language. His ideas are intact, as shown by gestures, and he can understand what is said to him and recognizes words and phrases which he cannot pronounce or even repeat. On the other hand, the amnesic patient no longer recognizes the conventional associations established between ideas and words. He can pronounce them, but they do not seem to have any bearing on the ideas he wishes to express. He is able to show by gestures that he has not lost all kinds of memory, but it is the special memory, not only of spoken but of written words, that is lost.

So far Broca's statements are admirably clear and consonant with fact. When however he comes to determine the site of the lesions responsible for these conditions, he becomes confused and indefinite. He saw clearly that the larger number of cases did not correspond to these two clean-cut divisions. In practice, both states can exist together and this greatly hampered the determination of the position of the lesion. He utters a wise warning on the necessity for drawing conclusions from selected cases only, and insists that it is "aphemia" which is caused by a lesion of the third frontal convolution.

Let us now turn to Hughlings Jackson's contribution to this discussion. He said nothing about localization beyond referring to his previous papers. As far as can be gathered from the summary [14, p. 59], he confined his attention to the nature of the loss of speech produced by cerebral lesions. He pointed out that healthy language consisted of two inseparable, yet distinct, forms: (1) Intellectual—i.e., the power to convey propositions; (2) emotional—i.e., the ability to exhibit states of feeling. These two are separated by disease. It is intellectual language alone which suffers in most of these cases; emotional language usually escapes altogether. Cases of affection of speech can be divided into two groups, in the first of which the patient is speechless, or nearly so; whilst in the second, he has plenty of words but uses them wrongly. He denied that there was such a thing as a

"faculty of speech" or a "faculty of memory," and says "The question is not, how is general mind damaged? but what aspect of mind is damaged?"

Thus, he laid down in this discussion the fundamental basis of the whole of his future treatment of the subject. It is the power to form propositions that is affected, and not the memory of words or faculty of language. The higher the propositional value of the task the patient is asked to carry out, the less he will be able to respond; whereas, the lower or more automatic the action required, the easier will it be to perform.

But subsequent investigators took no care to emulate the clinical acumen of Broca or the psychological insight of Hughlings Jackson. Bastian published his well-known paper in 1869 which had such an evil influence on the subsequent course of the discussion. He started from the *a priori* assumption that we think in words, and that words are revived in the cerebral hemispheres as remembered sounds. He talked of lesions of special fibres and centres, and set the points on the catastrophic road to schemas and diagrams. His subsequent Lettsomian Lectures [3], re-published in 1898 under the title "Aphasia and other Speech Defects," had, as a frontispiece, the famous diagram so often cited in subsequent discussions [4]. This book is little more than a widely expanded version of his original paper, and by its simplicity and dogmatism seduced the younger generation away from the difficulties and complications of Jackson's doctrine.

The first actual diagram was published by Baginsky in 1871 [1], who like most of the Germans was unaware that Bastian had already described word deafness. From this time onwards the rage for diagrams became a veritable mania. No one could write on aphasia without producing a new diagram of centres and the paths between them. Each author twisted the clinical facts to suit the lesions he had deduced from his pet schema. Wernicke in 1874 [21] localized the centre for auditory images in the first left temporal convolution, but would allow no centre for reading and writing; oral speech alone possessed cortical centres, one of which was guiding and the other emissive. Between these two lay the Island of Reil and three main forms of aphasia must therefore be possible. The first of these was sensory, and the lesion was situated in the temporal localization. The second was motor and the lesion lay in the third frontal convolution. The third variety was due to interference with conduction between these two centres.

How far the writers of this period were compelled to lop and twist the clinical facts to fit the procrustian bed of their hypothetical conceptions is shown by the famous case published by Wernicke in 1903, as "A Case of Isolated Agraphia" [22]. Now, such a title can only mean that in this patient every other act of language could be perfectly performed, except that of writing. But when the record of the case is examined, the patient appears to have had much difficulty with spontaneous speech, and in understanding what was read. She could not comprehend many spoken words, nor could she carry out commands given verbally. She is said to have shown almost complete inability to write, and it was with great difficulty she could be brought to make the attempt. She was also unable to draw to command, although she could copy drawings and writing, and she failed to say the days of the week or the months in their proper order. In the solemn discussion which follows, on the nature of disorders of speech, it is difficult to decide whether the clinical obtuseness or want of theoretical insight is more worthy of wonder.

Amongst the various diagrams that of Lichtheim [15] attained the greatest popularity. It was definite and precise; every form of aphasia was accounted for by a lesion of some hypothetical centre or purely imaginary path. Teachers of medicine could assume an easy dogmatism at the bedside and candidates for examination rejoiced in so perfect a clue to all their difficulties. But serious students could not fit these conceptions of aphasia with the clinical manifestations; incredulous of such scholastic interpretations, they lost interest in a problem of so little practical importance.

In 1906, Pierre Marie startled the medical world by three papers in the *Semaine Médicale* on "Revision of the question of Aphasia" [16]. The first of these bore the aggressive title, "The third left frontal convolution does not play any special rôle in the function of language," whilst the third was a fascinating historical essay on "Broca and his Times," together with an account of the re-examination of the hemispheres of his two first patients. This was followed by a series of papers on the subject of aphasia and its cerebral localization, culminating in the monograph of Moutier which appeared in 1908 from the laboratory of Pierre Marie at the Bicêtre [17].

Marie laid down that the aphasia of Broca was not a clinical entity but a "syndrome." It is a combination of two distinct troubles which he called "anarthria" and "aphasia." By "anarthria" he understood simply the inability or difficulty of articulating words. On the other

hand, aphasia was the sensory aphasia of Wernicke, characterized by troubles of internal language, which showed themselves directly in alterations of speech, reading and writing. There is nothing of aphasia in the motor trouble of the anarthric. He understands, he reads and he writes. His power of thinking is intact, and expression is possible by every other means except words, internal language remaining unaltered. There is only one aphasia, the aphasia of Wernicke, and the term "sensory aphasia" must disappear.

But the greatest excitement was produced by Marie's views on the cerebral localization of the lesion responsible for these defects of language. Of the two factors which constituted the aphasia of Broca, the anarthric aspect was due to a lesion of the "lenticular zone" whilst the aphasic side was produced by one in "Wernicke's zone." This latter was not a special loss of word memories, but was a defect of general intelligence, and of special intelligence of language.

In Moutier's monograph, "*L'Aphasie de Broca*," he gives an interesting history of our knowledge of aphasia, followed by a reconstruction of the nature and symptoms of this disorder from the point of view of his master, Pierre Marie. One of the most valuable portions of this book consists in a series of reports, both clinical and pathological, of a large number of cases. The second part is prefaced by a scheme of examination which is singularly complete.

By this time the differences of opinion in Paris had become so acute, that three sittings of the Société de Neurologie de Paris (June 11, July 9, and July 23, 1908) were devoted to a discussion of this question [9]. Unfortunately, though an attempt was made to keep the clinical and pathological aspects apart, this was impossible in practice. Two questionnaires were prepared to serve as the basis for discussion. The first of these was divided into "*Étude anatomique*" and "*Étude clinique*," whilst questionnaire B. consisted of three portions: (1) *Clinique*"; (2) "*Anatomie normale et pathologique*"; (3) "*Physiologie pathologique*." The second of these was accepted as the basis of discussion, which began as follows: "Are motor and sensory aphasia clinically different from one another, or is motor aphasia sensory aphasia accompanied by anarthria? If there are differences, what are they?" Unfortunately this led to a discussion based entirely on terms such as "Broca's aphasia," "total aphasia," "word blindness," "word deafness," "alexia," "agraphia," &c. Marie held strictly to the views set out above, whilst Dejerine defined his position as follows: "The aphasia of Broca is a motor aphasia and total aphasia is both sensory

and motor. The aphasia of Broca is accompanied by a loss of words, marked trouble in writing, some alexia, though not excessive; the patient is able to transcribe print into handwriting. On the other hand the sensory element consists in word deafness and word blindness.

Dejerine attacked the use of the word "anarthria," which should, he contended, be kept for definite troubles of articulation. Marie represented that he had chosen this word because cases of mere motor aphasia showed no disturbance of internal speech.

Dupré and others insisted that the motor aphasic had difficulty in evoking his words. Aphasia is a psychical defect and trouble of language ("langage"); anarthria, on the other hand, is a motor defect and a trouble of speech ("parole"). Marie answered that the anarthric had no trouble in evoking a word, but solely in pronouncing it, and he agreed to substitute the word *aphemia* for anarthria, provided the meeting would acknowledge that the phenomenon was not associated with a defect of internal speech.

The next sitting and the first half of the final sitting were devoted to an attempt to settle the situation of the lesion responsible for the various forms of aphasia. But, as no satisfactory clinical definition had been arrived at during the earlier phase of the discussion, the greater part of the time was spent in discussing the limits of Marie's lenticular zone and its justification. Finally, the meeting turned to a consideration as to whether there were disturbances of intelligence in motor aphasia, and if so, what form they took, and secondly, whether intelligence was disturbed in sensory aphasia. At this stage, Marie brought forward his views on the evident diminution of general intellectual capacity, which is found in those cases which he describes as the "aphasia of Broca." This is in no sense a dementia; he insisted on the exactness of the terms that he had used. "Il y a une diminution très marquée dans la capacité intellectuelle en générale" (p. 1037). This intellectual disturbance is a specialized defect. He admitted that the "zone of Wernicke" is the part where a lesion produced with certainty troubles of language, but he denied independent existence of special sensory word centres which had been attributed to this portion of the brain.

Marie fought hard for simplification and made a bold attempt to sweep away the vast accretion which had obscured the question of aphasia; but no one ventured to suggest that the greater part of the discussion of the clinical manifestations was purely a verbal battle. Had the disputants been familiar with the work of Hughlings Jackson, they would have recognized that, from the point of view of the question

at issue, all these terms such as "aphasia of Broca" "total aphasia," "word blindness," and "word deafness," were pure phrases, and did not in reality correspond exactly to any clinical phenomena.

I have kept the views of Hughlings Jackson until the last, because his attitude towards the question was entirely foreign to any conception put forward in the history of aphasia. His views bore no fruit during his lifetime for two reasons. Firstly, they were published in a series of papers between 1864 and 1893, many of which were inaccessible on the Continent. Secondly, the style in which they were written makes them peculiarly difficult to read. He was so anxious not to overstate his case that almost every page is peppered with explanatory phrases and foot-notes, so that the generalization can scarcely be distinguished from its qualifications. English students, accustomed to the fluent dogmatism of his contemporaries, turned away from the bristling difficulties of Hughlings Jackson's papers. Finally, the ideas he propounded were entirely opposed in their nature to the current opinions of the day. No one assimilated his views on defects of function and applied them to actual cases of loss of speech. We failed to appreciate how much closer these conceptions would have led us to the phenomena of aphasia than the glib generalities founded on the supposed anatomical facts of cortical localization.

When however I became interested in working out the problem of aphasia in the light of our researches on the effects produced by cortical lesions on sensation, it became obvious that none of the current doctrines corresponded to the clinical facts. I set to work to make a collection of Jackson's papers on the subject, and was startled to find that he had long ago arrived at several of the general conclusions which had led me to disbelieve the teaching of my contemporaries. In 1914, Pick's remarkable book "*Die agrammatischen Sprachstörungen*" [18] fell into my hands and determined me to republish Jackson's papers on aphasia in *Brain* [14].

In spite of its occasional obscurity Jackson's work is of peculiar importance to the neurologist of to-day, both as a practical guide to the clinical phenomena of aphasia and an understanding of the processes which underlie the production of speech. His views can be summed up shortly as follows:—

(1) In 1868, he pointed out that patients with aphasia can be divided into two main groups. In Class 1, the patient was almost speechless or speech was gravely damaged, but in the worst of these cases, the patient

could utter some one or two unvarying words or jargon. Class 2 comprises those who have plentiful words but habitually use them wrongly.

(2) The loss of power to carry out an order depends on the complexity of the task. The more abstract the conception, the more likely is the patient to fail in executing it, although he may succeed when it is put before him in a simpler and more descriptive form. Thus, the patient who could not find the word "kitten" called it "a little fur child," and one who could not draw a square when asked to do so, drew a perfect square when told to draw a block of wood. Thus, it is most important, when asking an aphasic patient to carry out some order, to present it to him if possible in several forms, noting his response in each case; because a man cannot write the alphabet, we must not assume that he cannot write a letter.

(3) The higher and more voluntary aspects of speech tend to suffer more than the lower or automatic. The least voluntary speech is that which is emitted under the effect of emotion, such as exclamations, oaths, and words such as "good-bye," rising to utterance under the impulse of a moment. In many cases "yes" and "no" can be used approximately as propositions, and even words and phrases of true propositional value may spring to the lips of the aphasic patient. But in such cases he is usually unable to repeat at will the phrase he has just used under an appropriate impulse. The "speechless man is not wordless," and the apparent inconsequence of observations on persons with aphasia is to a great extent removed by an analysis of the conceptual value of the words and phrases which are actually uttered.

(4) Writing is affected, not as a separate "faculty" but as a part of the failure to propositionize in words. There is no such condition as pure "agraphia." A man who cannot write spontaneously may be able to copy printed matter in perfect handwriting. The "faculty" of relating handwriting to print is intact; he cannot write voluntarily because he has lost the use of written words in propositions. Hence, he can usually write his name and address, because in most of us this has reached with time more nearly the level of an automatic act.

(5) Patients with such affections of speech may not be able to read aloud or to themselves, when asked to do so; but they can understand what is read to them and may even obey written commands, although unable to reproduce them in words. This is not due to some loss of function called "alexia," but to an inability to reproduce a proposition which, on the other hand, they may be capable of receiving accurately.

(6) "Imperception" is on the receptive side what aphasia is in the

"word series." In many cases the two conditions are combined; but they may exist separately, and, where aphasia is present without "imperception," images remain intact. Thus the patient may be able to point to colours and objects when they are named; he continues able to play cards or dominoes; he recognizes handwriting, although he cannot read the words written; he knows poetry from prose by the different endings of the lines on the right of the page.

Thus, affections of speech are caused (a) on the emissive side by inability to form or to express a proposition in words; (b) on the receptive side by failure of those mental processes which underlie perceptual recognition.

(7) External and internal speech are identical, except that one leads to the utterance of articulated words, whilst the condition of internal speech can be discovered by writing only.

(8) Behind external and internal speech stands the proposition which, when verbalized, can be expressed in speech or writing. This proposition is necessary for clear and logical thought, but not for all thinking. When this aspect of speech is affected, the patient cannot retain a sequence of abstract propositions, because he is unable to formulate them at will to himself. He can think, but he is "lame in thinking."

(9) If, however, "imperception" is added to such defect of speech the patient will not only suffer from "inferior speech," but will show signs of "inferior comprehension."

(10) In the majority of cases of affections of speech, mental images are unaffected. This extremely important contribution to the theory of aphasia has been entirely neglected by neurologists. For almost every hypothesis propounded in the last forty years presupposes some defect in "auditory" or "visual word images."

In 1910, it became obvious to me in the light of our work on the part played by the cortex in sensation, that new tests must be devised before the clinical investigation of aphasia could produce any satisfactory results. It is not sufficient to hold up some object and ask the patient to name it; at one time he may be able to do so, at another he fails completely. No conclusion can be drawn from one or two questions put in this way. His power of responding must be tested by a series of observations in which the same task occurs on two or more occasions.

Not only is it necessary to arrange the tests in sequence, but each set must be put before the patient in several different ways. For example, six common objects are laid on the table in front of him, and

he is asked to point to the one which corresponds to a duplicate placed in his hand out of sight. This is repeated for from eighteen to twenty-four observations, so that the choice of any one object recurs three or four times in the course of the series. Then he indicates each one in turn as it is named by the examiner, or makes his selection in answer to printed words set before him on a card. He next gives names to the various objects, one by one, and finally writes them down without saying anything aloud. The order in which these various acts are performed remains the same throughout the different aspects of the test. This alone makes it possible to draw any conclusion from the inconstant responses, which are so disconcerting, unless the answers are recorded in this manner. Moreover, this method enables us to learn how the patient responds to the same series of tests put before him in different ways. I have described all these methods of examination in a recent number of *Brain*, and shall not dwell further upon them [13]. The principle upon which they are based is to set a similar task before the patient through various forms of command; these he must execute by different methods. He is no longer asked to speak, to read or to write; but all these methods of expression are used to answer the same series of tests.

As soon as I began to apply these methods of examination to patients suffering from aphasia, it became obvious that none of the ordinary theories bore any relation to the facts I discovered; it was not until I had read through a complete series of Jackson's papers that I recognized the importance of the principles he had enunciated in the light of my own observations.

Shortly after the beginning of the War, patients began to pass into my care with wounds of the head, who suffered from defects of speech slighter and more specialized than any I had seen before. Moreover, these young men were struck down in the full pride of health; many of them were extremely intelligent and anxious to be examined thoroughly. As their wounds healed, they were encouraged and cheered by the obvious improvement in their condition. They were euphoric rather than depressed, and in every way contrasted profoundly with the state of the aphasic patient met with in civilian practice. From this time onwards the work progressed rapidly, and the results that I shall lay before you are based mainly upon these cases of unilateral wounds of the head.

But, before we enter on the positive results of these researches, I am anxious to clear the ground of certain preconceptions. We know

that speech can be affected by destruction of the substance of the brain, but this does not show that "the faculty of speech" is localized in any area of the cortex. We should as soon expect a special centre for eating as for speech; both are complex acts which do not correspond to any specific group of functions. No lesion, however local, can affect speech and speech only. The cerebral injury disturbs certain physiological processes which subserve the complex acts which we speak of as speech. Now, no anatomical lesion corresponds exactly to a single group of physiological functions; the acuteness and severity of the onset is often a more important factor in determining their nature than the extent of the lesion. On the other hand, there is no single psychological function or "faculty" corresponding to speech; any organic injury which produces a disorder of speech disturbs other functions not usually associated with language, or leaves unaffected much that undoubtedly belongs to speech. We must therefore get rid of all those *a priori* conceptions, which underlie such terms as "motor" and "sensory" aphasia, "alexia," "agraphia," or "amnesia verbalis." No disorder of speech due to a unilateral lesion of the brain corresponds exclusively to any one of these categories, still less can these hypothetical conditions be associated with limited destruction of any one part of the brain.

An organic lesion disturbs certain physiological processes which are necessary for the complex acts which underlie the use of language. Words, numbers, pictures, and every function which depends upon the use of these symbols in constructive thought may be affected. Any mental process is liable to suffer which demands for its performance exact comprehension, voluntary recall, and perfect expression of symbolic representations. I have therefore suggested that the various functions disturbed in aphasia and allied conditions might be spoken of as "symbolic thinking and expression," because it is mainly the use of words, numbers and pictures, which suffers in these disordered states. But this name must not be taken as in any way defining the group of processes affected; I should have preferred, had it been possible, to have employed some entirely different term. For it is symbols used in a particular manner which suffer in these disorders and not all symbolic representations.

The more nearly the symbolic action approximates to a perfect proposition, the greater difficulty will it present, and the patient will probably fail to execute it correctly. Conversely, the more closely it corresponds to matching two sensory patterns, the less likely is it

to be disturbed. Highly complex symbolic acts suffer more gravely than those of lower propositional value. For example, if a patient seated opposite the observer attempts to imitate a series of movements which consist in touching the eye or ear with one or other hand, he may fail grossly. He can however execute them perfectly when the observer stands behind him and they are reflected in a mirror. For in order to imitate movements sitting face to face he must formulate the various factors which make up the command; whilst to copy them when reflected in a mirror is an act of almost pure imitation. But if, instead of imitating the movements, he is asked to write down what he sees in the mirror, he again fails grossly; for he is now compelled to formulate the task in words, and so fails to describe gestures he can imitate perfectly.

The higher the propositional value of the mental act, the greater difficulty will it present. Thus, the patient may be able to execute a printed command to hold up his hand, although he is unable to carry out an order to touch with it his eye or his ear. The addition of the second factor has rendered the task too difficult. The larger the number of alternatives presented by the order, the more certainly will the desired action be defective. All propositions express an abstract relation; but even the same generalized statement may vary in difficulty according to the means by which it is expressed. For example, during the compass test, the aphasic patient may be entirely unable to record in speech, or in writing, whether he has been touched with one or two points; but if the figures 1 and 2 are written on a sheet of paper, he can indicate correctly whether the contact was single or double. Under the ordinary conditions of this test, he is not only compelled to formulate the words as sensory impressions, but he must express them in verbal symbols; but when it is carried out according to the second method, he has only to determine whether his sensations are of one or two points, and the means of expression lie on the table before him. When the defect consists of want of power to evoke words or names, the patient may be unable to name a set of common objects, although he may choose them correctly to oral or printed command. The verbal symbol conveys its proper meaning when presented ready formed in sound or in print; but to produce it freely at will demands a greater perfection of symbolic thinking and expression. In the same way when an aphasic calls scissors "that is the tweezers to cut with," he is expressing a lower grade of symbolic recognition. One of my patients was unable to name a series of colours placed before him, and could not choose them cor-

rectly to oral or printed commands. But if instead of the names he was allowed to call black, "what you do for the dead"; red, "what the staff wear," with similar descriptive phrases for each of the other colours, he named them all correctly. These metaphorical modes of expression are simpler than names which consist of a single word; for the more concrete is lower in the hierarchy of mental processes than the general and abstract.

Behind every propositional expression lies recognition of the meaning of symbols; I must be able to appreciate the full significance of words, numbers, and pictures before I can pose them in propositional form. This loss of meaning is the cause of many aphasic defects; thus, the short and the long hands of the clock have acquired a significance which converts each one of them into a direct symbol, and they are often confused, or used wrongly in cases of aphasia.

When adding two numbers together, it is easier to reach the answer by counting than by direct proposition. Thus, many aphasics can add 6 and 3 by saying to themselves 6, 7, 8, 9, but cannot formulate $6 + 3 = 9$. For the same reason some of them could set the clock correctly to a command given in railway time, but not if it was expressed in words. Told to set the clock at 4.45, the patient placed the hour hand at 4, and then swept the other round the face to a position he associated with 45 minutes. But asked to set a quarter to five, he placed the one hand at 5, whilst the other hovered uncertainly between a quarter past and a quarter to. This does not depend on a difference in the power of comprehending words and numbers; for when the patient attempted to tell the time it was equally difficult for him to evoke the names "4.45" and "a quarter to five."

Many of the disorders found in aphasic patients are the result of inability to recognize the significance of words and names. If, however, they fail to appreciate with certainty the ultimate meaning in thought, they are liable to become confused over the intention of an action, whether self-suggested or imposed from without. The patient no longer perceives clearly the goal at which he must aim. Thus, a young officer could thread a quadrilateral frame for his bee-hives if the action consisted in bringing the wire across from one side to the other and back again through neighbouring holes, but as soon as he attempted to go from corner to corner, he failed entirely.

Perfect symbolic thinking and expression demand that words, numbers, pictures, and all they stand for in thought should be susceptible of voluntary manipulation. It is this aspect that is usually

affected in the more verbal forms of aphasia and in those that are characterized by the use of jargon; these are not due to "dysarthria," but are produced by defective conceptions of the structure and rhythmic balance of the symbol, which interferes not only with articulated speech but also with internal verbalization. All these functions are not uniformly disturbed in every instance, and aphasics differ profoundly in their clinical manifestations. The majority, especially in the earlier stages, show evidence of widespread defects in the use of language; the more acute and severe the lesion, the graver and more extensive will be the disorder it produces. Many of these changes may disappear, and sometimes the patient recovers entirely; but, in serious cases, one or more aspects of symbolic thinking and expression remain affected over a considerable period, and the aphasic manifestations consequently assume some particular form.

Analysis of these clinical varieties seems to show that the various functions included under the term "symbolic thinking and expression" can be dissociated in different ways under the influence of organic injury. They do not correspond to different stages of dissolution or recovery; nor do they reveal directly the elements out of which language is built up. On the contrary, they show the components into which a highly complex set of psychical processes can be separated by destruction of certain portions of the brain. Provided we bear these principles in mind, we are justified in grouping the clinical manifestations under separate headings. Each case of aphasia is the result of the loss of one or more of these groups of functions; fortunately, all of them are rarely affected in the same patient, for, if this were the case, he would be reduced to a state in which all detailed examination would be impossible. Thus, in each patient we must determine which functions are disturbed and which have remained unaffected. By careful analysis it seems possible to separate these disorders of speech into four main varieties; but it must be remembered that they can appear together in every combination.

To each of the groups I have given the name chosen from the most salient defect in the use of words.

(1) *Verbal Aphasia*.—This is essentially a disturbance of word formation; words are evoked with difficulty, the patient's vocabulary is greatly restricted, and enunciation is slow and halting. Writing tends to show the same sort of errors as articulatory speech and spelling is defective. The patient has difficulty in reading to himself with pleasure, because he is unable to retain in his memory a long series of words.

Numerals are affected to a slighter degree; their significance may be recognized and acted on correctly, although they are wrongly enunciated. As speech returns, commands given in spoken or printed words can be executed, but orders which necessitate the evocation of some word or phrase may be carried out badly. These patients recognize, however, whether the task they are attempting has been performed correctly or not. They can draw, play card games, and appreciate jokes set out in print or in pictures. It is this group of defects which is mainly responsible for the condition described by Broca as "aphemia" and usually spoken of as slight "motor aphasia."

(2) *Syntactical Aphasia*.—This is an easy form to distinguish because the patient tends to talk jargon; not only is articulation of the word ill-balanced but the rhythm of the phrase is defective, and there is want of grammatical coherence. Speech, once started, is voluble and words are emitted with great rapidity; sometimes each one is comprehensible, however difficult it may be to gather the full meaning of the phrase; but in other cases the words uttered are pure jargon. The power of naming objects placed before him may be retained by the patient, in spite of the jargon by which he is hampered. Not infrequently, when he cannot utter some word, or when the sound emitted is incomprehensible to his auditor, he can write the name correctly. These patients can read if they are not compelled to reproduce the meaning in words; writing is usually less affected than external speech, and single words, especially names in common use, can be written correctly; but any attempt to convey a formulated statement is liable to end in confusion. This form was described by Hughlings Jackson, but has not received the attention it deserves except in the writings of Pick.

(3) *Nominal Aphasia*.—This is essentially a defective use of names and want of comprehension of the nominal value of words or other symbols. The patient reads with extreme difficulty, especially if he attempts to spell out the words; writing is gravely affected, but he may be able to copy print into cursive handwriting. Writing to dictation and all actions demanding choice are performed with difficulty to spoken command; counting is possible to a varying extent, but the significance of numbers, the power to carry out simple arithmetical operations, and appreciation of the relative value of money are usually more or less affected. The patient is unable in most cases to draw an accurate ground plan of some room with which he is familiar; he cannot play cards, but chess and draughts may be possible. This form cannot be fitted into any of the older methods of classification; for, on the one hand, it has

some of the characters of "motor aphasia," whilst, on the other, other defects would have been attributed to "sensory aphasia." The separation of word-formation from naming and its allied functions is an entirely new feature in the classification of the aphasias.

(4) *Semantic Aphasia*.—So far, the names I have applied to the various forms of disorders of speech have borne some relation to the verbal defects; for this group, however, it is difficult to find a suitable designation that will express the essential nature of the disturbance which extends beyond the limits of organized words. I have chosen the term "semantic" as a label for this form of aphasia, because the affection comprises want of recognition of the full significance or intention of words and phrases. The patient may understand each word or short phrase exactly as he can comprehend the details of a picture, but the ultimate meaning escapes him. He fails to grasp the final aim or goal of the action imposed upon him from without; he cannot formulate symbolically a general conception, although he can enumerate the details of which it is composed. He can read and write, but the result tends to be inaccurate and confused, counting is possible and the value of numerals can be recognized, but arithmetical operations are impossible, or are carried out uncertainly and with difficulty. The patient is unable to add or subtract, because the mathematical process itself is incomprehensible. He fails entirely to comprehend most jokes, especially if they demand the complete understanding of a picture or its legend. He cannot play card games or put together puzzles, which confuse him greatly. These semantic disorders interfere seriously with the actions of daily life and render the patient useless for any but the simplest employment; and yet his memory and intelligence may remain on a comparatively high general level. He does not forget people or places, and can recall accurately events, both recent and remote; but he has lost the power of appreciating the ultimate or non-verbal meaning of words and phrases, and fails to recognize the intention or goal of actions imposed upon him.

I have attempted to put before you shortly a conception of the phenomena of aphasia, based on a systematic re-examination of the clinical facts by new methods. The results I have obtained are of no direct practical value to the physician, but they form a fascinating example of the interaction of body and mind, one, moreover, capable of experimental demonstration. This problem has occupied the attention of the acutest human intellects for over two thousand years. The schoolmen answered the eternal riddle in material terms founded on

imaginary anatomy. They were followed by the philosophers, who, for the most part, spun their theories out of *a priori* conceptions. Then came the era of the physicians, who were unwillingly forced to face the question, because the most illuminating examples of the effect of bodily conditions on the state of the mind were entrusted to them for therapeutic supervision. They developed an extensive and accurate acquaintance with the anatomy of the brain, but employed the fruits of this great advance in knowledge in the service of an obsolete and almost mediaeval psychology. Fifty years ago Hughlings Jackson raised the question of disorders of speech to a higher plane by rejecting all *a priori* conceptions; but he stood alone and medicine turned a deaf ear to his teaching. To-day, however, the older psychology is tottering to its grave, and I am proud to think that a long continued and arduous series of researches has led me at last to understand that great empiric philosopher, the founder of English neurology.

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Section of Neurology.

President—Dr. ERNEST S. REYNOLDS.

The Causes of Nervous Diseases.

PRESIDENT'S ADDRESS.¹

By ERNEST S. REYNOLDS, M.D. (President).

(ABSTRACT.)

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In dealing with the causes of nervous diseases I will use the classification of the causes of disease generally which I attempted to formulate in the Bradshaw Lecture in 1917, the groups being: (1) Injury, (2) food and feeding, (3) poisons, (4) occupation, (5) stress, (6) abnormal metabolism, (7) abnormal age changes, (8) neoplasms, (9) parasites and micro-organisms, (10) heredity.

(1) *Injury*.—The lesions due to gross injury require no further mention, but I think the effects of heat and cold are factors in producing nerve lesions. Apart from those cases of traumatic hysteria and neurasthenia, which are really either feigned or purely emotional, there are probably cases of neurasthenia which may be due to some definite molecular change in the central nervous system or in the endocrine glands. It is possible that the long-lasting local pain, secondary to tearing of minute muscular or tendinous attachments, may be due to the involvement of nerve fibrils in cicatricial tissue.

(2) *Food and Feeding*.—I know of no nervous diseases caused by uncontaminated food in this country, however much it may be possible

¹ At a meeting of the Section, held October 14, 1920.

to associate beri-beri, ergotism, pellagra and lathyrism with the dietary of foreign countries.

(3) *Poisons*.—Apart from alcohol, lead, arsenic and mercury, few nervous diseases are caused by poisons. But carbon monoxide and also the fumes from burnt coal gas occasionally give rise to marked peripheral neuritis, principally of the motor type.

(4) *Occupation*.—This seldom causes nervous affections. The various "cramps"—writer's, telegraphist's, hammerman's, or pianist's are all, considering the number of persons so engaged, very rare, writer's cramp being, of course, the commonest. Many cases of progressive muscular atrophy are probably due to the early death from over-use of the small central cells of the anterior horns, those cells which have specially developed relatively late in life, as the occupation has become a specially skilled one; in the needlewoman the hand muscles are first affected, in the tram driver the muscles of the right forearm (from using the brake), and in the miner and puddler the muscles of the shoulder and upper arm.

(5) *Stress*, caused by overwork, hurry and worry is the origin of much nervous disease. It is a frequent factor in causing cerebral arteriosclerosis; it is the cause of the purely acquired neurasthenia, which is cured so thoroughly by absolute rest and change of surroundings. I have always considered Graves' disease as primarily a nervous disease, and caused by stress in a certain type of person.

(6) *Abnormal Metabolism* may be the cause of diabetic neuritis associated with changes in the posterior columns, and there may be a gouty neuritis. The combined postero-lateral degeneration found in many anæmias and in certain exhaustive states probably belong to this group, and also perhaps cases of tetany. Is myasthenia gravis, with the fatty changes in the thymus gland, and are the lymphorrhages in the muscles due to same altered metabolism?

(7) *Abnormal Age Changes*.—One of the commonest nervous affections seen in a great industrial area is early cerebral arteriosclerosis with resulting brain softening. I have seen a case commencing at 42 years of age, several before 50, and very many at about 60. Its symptoms vary greatly; some cases resemble at first sight general paralysis of the insane; some are affected in the muscular system, with hemiplegia or paraplegia with pseudo-bulbar paralysis; others are affected in the intellect, and some, from the altered speech and increased reflexes, may be mistaken for disseminated sclerosis. Of a similar pathological origin is senile paraplegia from early senile changes in the long narrow

arteries supplying the lumbo-sacral cord. Paralysis agitans and intermittent limp are due to early senile change, and probably so chronic anterior poliomyelitis.

(8) *Neoplasms*.—It would be of great value, especially for medico-legal purposes, to know whether or not injury is a cause of growths of the brain and cord. Such a connexion is very likely, although injury may only so act in people with some predisposing condition.

(9) *Parasites and Micro-organisms*.—The gross parasites, hydatids or cysticercus cellulosæ, very rarely affect the nervous system. But the other parasites, the micro-organisms, are of course the cause of very many nervous diseases, including those caused by the tubercle bacillus, the *Spirochæta pallida*, rheumatic fever and the acute infectious fever germs, the septic and pyæmic organisms, tetanus, rabies, &c. Probably all forms of meningitis and myelitis (apart from direct injury) are microbic in origin and the "reflex paraplegias" have become more understandable since the researches of Orr and Rows. Acute ascending paralysis is almost certainly due to bacteria or their toxins, and recently acute lethargic encephalitis has again visited mankind after a long interval of years. Of all single nervous diseases disseminated sclerosis is by far the commonest I see, and its distressing effects are so great that it is to my mind the disease of all others for which research is urgently needed. Its symptomatology and course are such that one is quite prepared to believe that a special spirochæte has been discovered by Siemerling (confirmed by Marinesco and others), and it is on these lines that research work should be done.

(10) *Heredity* is probably the commonest primary cause of nervous diseases. The bulk of insanity is handed down, nearly all epilepsy, migraine, psychasthenia, much neurasthenia, habit spasm (including stammering), adult chorea, the tendency to early cerebral arteriosclerosis, Friedreich's ataxia, hereditary cerebellar ataxia, familial spastic paraplegia, peroneal atrophy and the various types of myopathic paralysis. A few of these I will refer to specially.

Epilepsy I define as a disease characterized by a definite alteration of the brain cortex which renders it, as the result of some irritation, abnormally liable suddenly to liberate energy. Whether this alteration is a structural one or an abnormal instability of the latent nerve energy I am not prepared to discuss, but the irritation may be anything from mental worry to intestinal worms. Putting aside those cases of convulsion due to definite structural coarse changes in the cortex, such as tumour, inflammation or softening, and various toxic states

such as lead poisoning or Bright's disease, I consider all true fits are due to essential epilepsy; the teething convulsion, the fit after a fright or the fit coming on a few days after a slight head injury, even if never followed by another. Furthermore, I consider all essential epilepsy is hereditary after alcoholism, insanity or epilepsy in the ancestors, but as a rule it is epilepsy itself. The difficulty of obtaining family histories in epilepsy is for various reasons great, but the more one investigates the more one is impressed that heredity is an essential factor.

Migraine is another strongly hereditary affection, generally handed down from the mother. Its resemblances to epilepsy in broad outline are remarkable, but in detail are so different that they cannot be regarded as the same disease.

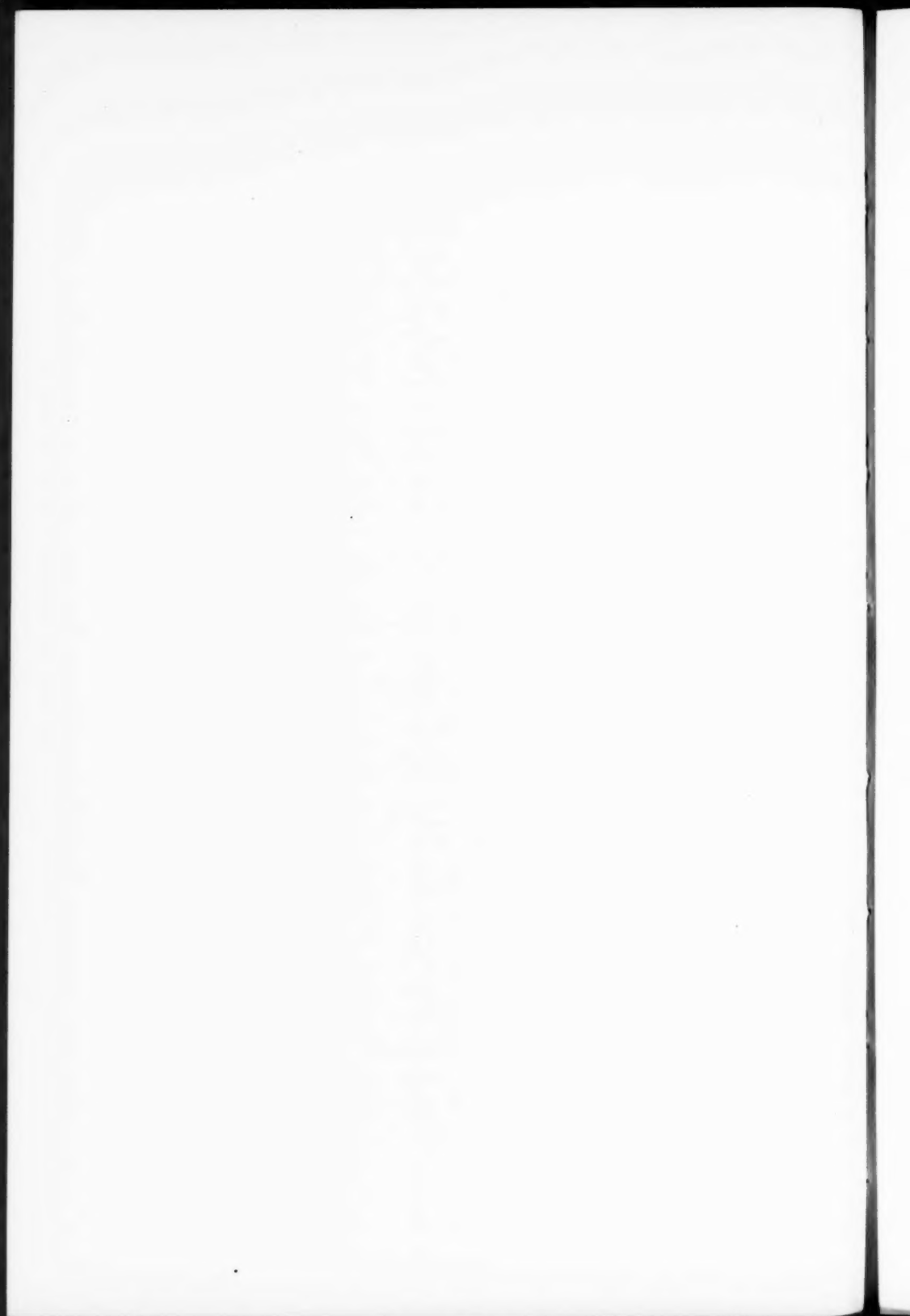
In addition to the acquired neurasthenia due to severe stress of which I have already spoken, there is another type with very similar symptoms which, however, comes on in much younger subjects and in which the stress may be very slight or indeed difficult to elicit. This is an hereditary neurasthenia and is much more difficult to cure, indeed it may be incurable as relapses so frequently occur.

Another strongly hereditary affection is psychasthenia in which the mind is involved to such an extent that, although not insane, some of the patients are borderland cases, and in some their ideas finally so influence their conduct that insanity supervenes.

Hysteria and Malingering.—I define hysteria as a mental condition in which a disease is imagined and assumed, but for which there is no known physical cause in the assumer, the basis of the condition being a morbid craving for sympathy or notoriety, or both. It is often most difficult to be able to distinguish between hysteria and malingering, and yet in medico-legal work it is most essential. For hysteria, even as defined above, has to be paid for in actions for compensation, but malingering being a deliberate fraud has not. So that I would define malingering as a condition in which there is a deliberate assumption of a disease, the basis of the assumption not being a morbid craving for sympathy or notoriety, but a desire for personal and material gain. (A series of apparently similar cases was given in parallel, one being hysterical, the other malingering.) In both hysteria and malingering any disease may be imitated which the person has seen or heard of or read about, but never one of which the person has no previous knowledge; and secondly, in both conditions there must be an audience. As a rule the condition produced is one that can be examined by an observer, such as assumed blindness, deafness, mutism, loss of sensation,

loss of power, vomiting, or pyrexia. But sometimes both in hysteria and in malingering there is merely the complaint of some pain, for the existence of which one has no evidence except the statement of the person.

Frequency of Group Incidence.—It is difficult to allot to each causation group its proper value, partly because we have no tables of morbidity to refer to and also because the classification is not truly logical as the groups are not mutually exclusive. But taking my own experience I should place heredity as the chief cause of nervous diseases (including, of course, insanity), then micro-organisms, then abnormal old age changes and stress, and about this level, injuries (as I see many compensation cases). The remaining classes I cannot value accurately. Food would be low in the list, as would also be poisons. Neoplasms are rare, and metabolism and occupation are probably lowest in the list. But each one of us might be inclined to arrange the list differently according to his personal experiences.



Section of Neurology.

President—Dr. ERNEST S. REYNOLDS.

Discussion on Aphasia.¹

(THE HUGHLINGS JACKSON LECTURE, 1920.)²

Dr. HENRY HEAD, F.R.S., said that (1) it was universally acknowledged that speech could be affected by destruction of the substance of the brain. If the lesion was acute, all aspects of the act of speech might be generally reduced. As the nervous tissue recovered, all these functions might return more or less together, and the aphasia disappeared without the manifestations assuming at any time a specific form. This generalized loss of function was particularly liable to occur when the disorder of speech was produced by vascular lesions or by any condition that lowered the vital activity of the brain. In cases of head wounds it was therefore important to wait until the original nerve shock had passed away and the wound had healed, before attempting to draw any conclusions as to the supposed specific character of the loss of speech. It might happen, however, after the acute stage has passed away, that the lesion of the brain was found to have affected the production of those physiological activities which underlay one or more special aspects of the perfect use of language and allied functions. Speech consequently assumed in such cases a clinically specific form.

(2) The categories of such partial forms of aphasia could only be drawn up in terms of the tests employed; they did not correspond to exclusive loss of speaking, reading or writing, nor could they be divided into "motor" or "sensory" abnormalities. As the result of serial tests, he had found that no descriptive term covered all the functions disturbed in one or other forms of aphasia and kindred disorders of speech. For amongst these functions were many which were not usually associated with speech. He had therefore adopted the name "Symbolic Thinking and Expression" because it represented that group of psychical activities which was most

¹ At a meeting of the Section, held November 11, 1920.

² Already published, see *Proceedings*, 1920, xiv (Sect. Neur.), pp. 1-22.

severely affected by unilateral lesions of the brain. Analysis of the clinical varieties of aphasia seemed to show that the various functions included under this term could be dissociated in different ways under the influence of organic injury. They did not correspond to different stages of dissolution or recovery: nor did they reveal directly the elements out of which language was built up. On the contrary they showed the components into which a highly complex set of psychical processes could be separated by destruction of certain portions of the brain. Something was lost which made perfect speech impossible and the whole act assumed an abnormal form. Part of the manifestations were due to the negative aspect of the disturbance, part to the disorderly activity of function which remained.

(3) Before attempting to determine what portion of the brain when injured was associated with the different clinical affections of speech, it was necessary to discover by serial observations the nature of the psychical disturbance in each particular case. In the past attempts had been made to localize the anatomical site of the lesions responsible for "motor" or "sensory aphasia," "alexia" or "agraphia." But these *a priori* terms did not correspond to any specific functional categories discoverable in cases of these disorders of language due to a unilateral lesion of the brain. The fact that specific clinical forms of aphasia occurred showed that some lesions affected one aspect of the language mechanism more than another. He was prepared to enter on this question later, but was anxious that the present debate should be concerned with the nature of the loss of function produced by a unilateral lesion of the brain and with the clinical forms it might assume.

Dr. J. S. COLLIER opened the discussion by emphasizing the necessity for a revolution from the older theories which had been held upon the subject of aphasia on the ground that these theories were theoretically imperfect and unsound and clinically untrue. He welcomed Dr. Head's abandonment of the many so-called types of aphasia, and was mainly in agreement with most of the opinions which Dr. Head had put forward in his recent work published in *Brain* and in the Hughlings Jackson Lecture. He was convinced, however, of the reality of the "pure" or subcortical type of aphasia from subcortical lesions, which isolated the speech region of the cortex either upon the incoming or upon the outgoing side. He had seen "pure word blindness," "pure aphasia," and one case of "pure agraphia," in which localized subcortical lesions exactly corresponding with Déjerine's theoretical lesions were found. He agreed with Dr. Head in repudiating the conception of separately and succinctly localized, visual word centre, auditory word centre, and executive speech centres. He was of opinion that inasmuch as word blindness, word deafness, and so-called motor aphasia appeared as the result of gross organic lesions of the left hemisphere, these were the result, not of destruction of speech centres but of isolation of the speech region of the cortex by severance of incoming and outgoing paths respectively. He pointed out that speech was learned and used not as isolated words but as a running pattern of sound, &c.,

of which the individual elements had little entity in consciousness. He drew attention to the great importance of the varying degrees of depression of function in the interpretation of disorders of speech from cerebral lesions. He considered that the serial method of investigation of speech disorders described by Dr. Head was admirable. He was unable to pass any criticism of value upon Dr. Head's proposition that the defects of speech from cortical lesions fell into the groups of "verbal defects," "nominal defects," "syntactical defects," and "semantic defects," until he had investigated cases in the light of this classification, but he could not either upon developmental, theoretical or introspective grounds, see why speech should so break up in its devolution. He held most strongly that the common syntactical defect "jargon"-aphasia was always due not to a cortical lesion but to a lesion isolating the speech region from its auditory afferents and perhaps also from its common-sense afferents, whereby in normal speech consciousness was immediately informed of correct execution or otherwise, in speech.

Sir JAMES PURVES STEWART said that they were so accustomed to receive original and stimulating thoughts from Dr. Head that whenever he brought them something fresh, many of them tended to be prejudiced in advance in his favour. This, of course, being a mere thalamic feeling-tone and not a process of cortical reasoning, was just as wrong as it would be if they were to start prejudiced against him.

At the outset he wished to say that Dr. Head's conception of aphasia was full of instruction to all of them. No one would venture to cast doubts on Dr. Head's clinical observations. Everyone must be grateful for the new scheme of investigation which he had presented and for the various interesting clinical facts which this scheme had brought out. The proposed new classification of aphasia into four new varieties—viz., verbal aphasia, nominal aphasia, syntactical aphasia and semantic aphasia—was of the highest psychological value. But to the speaker there was no adequate reason why previous clinical experiences should be thrown overboard. Aphasia could still be classified, as hitherto, into psycho-motor aphasia (aphasia of expression or verbal apraxia) and psycho-sensory aphasia (aphasia of comprehension or verbal agnosia), more especially as these two great clinical divisions corresponded to well-established anatomical facts.

Sir James illustrated his contention by quoting six cases of relatively slight disturbance of the functions of speech, in five of which the cerebral lesion was due to a gunshot wound. His sixth case, which he described as an example of uncomplicated psycho-motor aphasia, was of particular interest. The patient was admitted into the Westminster Hospital with signs of acute cardiac failure due to old aortic disease. Twenty minutes after his admission to the ward he suddenly became speechless and his face asymmetrical. There was no impairment of intelligence and he was able to understand and execute all sorts of verbal commands but he could not utter a single word. He died two days later and at autopsy it was found that a small area in the brain, in the lower

third of the pre-central gyrus on the left side, presented a dark marbled appearance. A small cortical arteriole had been blocked by an embolus. The lesion extended deeply into the operculum, but the insula and the basal ganglia (Marie's "lenticular zone") were unaffected. No other lesions were discovered in the brain.

The speaker maintained that in cases of psycho-motor aphasia there was a lesion in the anterior or psycho-motor area of the brain, whereas in psycho-sensory aphasia the lesion was situated in the psycho-sensory speech-areas, whether psycho-auditory or psycho-visual. In both classes of case there was always a certain amount of intellectual disturbance, the equilibrium of the speech-areas being rendered less secure. He criticized Marie's well-known views on aphasia and argued that motor aphasia was not a mere paralysis of the lips and tongue but was a true apraxia due to amnesia of the movements of articulation.

Dr. KINNIER WILSON said that it was with a certain amount of hesitation he ventured to express his views with regard to Dr. Head's recent contributions to the difficult subject of aphasia. Perusal of his papers was not enough, perhaps, to justify criticism or even to arouse full appreciation; it was evident that the student of the question must himself utilize some or all of Dr. Head's ingenious tests for the aphasic in order to be in a better position to pass comment on his conclusions. Nevertheless Dr. Wilson believed that certain general considerations were worthy of a little attention. He commented upon the fact that the question of localization had not as yet been discussed by Dr. Head and disagreed with the view that the "gunshot wound of head" type of case formed the most suitable material for a study of the subject of aphasia. The ideal case was that with an isolated vascular lesion the exact position of which there was opportunity to establish post mortem.

Dr. Head had shown that the various types of aphasia were produced by dissociation of a definite mental process which he designated "symbolic thinking and expression," and with this view the speaker was in entire agreement. No one, he said, could suppose that aphasia was due to loss of motor or sensory power; if a patient had his speech musculature paralysed absolutely, he was anarthric, or if paresed, dysarthric; but these were phenomena of a lower (middle) level, and the same was true of ordinary cortical blindness or deafness; these were not elements of "aphasia." He also agreed with the author that aphasia was not due to "diminution of general intellectual capacity," although he considered that certain of Dr. Head's tests, in particular his "mirror" test, were tests of intellectual capacity rather than of speech activity in the ordinary sense.

Dr. Wilson criticized the statement that aphasic defects were not due to destruction of images. It might, he said, be impossible to prove that images were not destroyed but for the practical purposes of speech they were "lost." The patient was unable, owing to his organic disease, to awaken them when he wished to. To the speaker, it was unjustifiable to withhold the use of the

familiar terms "aphasia," "alexia," and "agraphia," on the ground that the disorders of language produced by a unilateral lesion of the brain were never "exclusive affections of speech, reading or writing." Rarity, or even absence, of "pure" cases of alexia or agraphia did not seem to him a conclusively adequate reason for abandoning useful clinical descriptive terms. If the absence of separate implication of any constituent in speech was to be advanced as an argument for the relinquishing of the above terms, exactly the same argument would apply to Dr. Head's own new classification of the varieties of aphasia into "verbal," "nominal," "syntactical" and "semantic" groups, since Dr. Head stated these did not occur in "pure" form.

Dr. Wilson did not question the clinical occurrence of the forms of aphasia described by Dr. Head but he did not see that the "new" types in any way ran counter to the hitherto accepted and familiar subdivisions. Verbal aphasia closely resembled ordinary motor aphasia; the nominal variety was one commonly observed. Syntactical aphasia, with its "jargon"-aphasia, had been described in the group of sensory aphasia, while semantic aphasia was largely identical with agnosia, in particular with that described by Liepmann and others as ideational agnosia. Dr. Wilson commented upon the fact that Dr. Head had not used either of the terms agnosia or aphasia in his papers, although it was obvious that he was frequently describing apraxic and agnostic phenomena. He believed that the subject of aphasia could best be understood if disorders of these "faculties," and the other mental activities mentioned by Dr. Head, were looked at from the point of view of apraxia and agnosia.

In conclusion the speaker summarized his own views on aphasia. He accepted the general division of aphasia into receptive and executive defects and held that ordinary motor aphasia was but a part of motor apraxia and sensory aphasia of agnosia.

Dr. STANLEY BARNES (Birmingham) remarked upon the very interesting way in which Dr. Head had started what appeared to be a new form of investigation of disorders of speech. He thought the scheme of examination which Dr. Head had put forward was likely to lead to more accurate results and a clearer understanding of the speech mechanism than those hitherto obtained. He himself had not had experience in examining patients on this new basis, but thought that the method now suggested was likely to carry them as much further in the analysis of speech defects and localization of speech function in the future, as Dr. Head's extremely valuable researches into the various forms of sensation had enlarged their knowledge of the sensory paths. At the same time, he was rather sorry Dr. Head had published his paper in the somewhat incomplete form in which it had gone out. It would have been better if he had either included with it as published the addendum he had just read out, or waited a little longer before publishing. It gave the general impression that, after all, localization of speech was a thing which had now practically gone by the board. He did not for an instant believe that was Dr. Head's intention. He hoped that would be made clear in Dr. Head's reply.

A point he would have liked to have heard more emphasized by Dr. Head was that intellectual faculties were so closely bound up with speech, that one must expect them to be represented in the same area of the brain, and that any serious defect in speech must mean a serious defect in intellect too. In some of the cases Dr. Head quoted there was a suggestion of great speech defect with no material loss of intellectual capacity; he (the speaker) found it difficult to believe that. The neurologist was dealing with patients of such varying degrees of intellectual capacity, and he knew so little at first hand about the patient's intellect as it was before his lesion, that it became very difficult to estimate what was the degree of intellectual defect, if any. It was his own belief, from clinical and psychological investigation, that the two functions, speech and intellect, were largely interdependent and were represented in the same area of the brain.

It might be going further than Dr. Head wanted to go that night, but he (the speaker) would like to hear whether Dr. Head could suggest any localization, or any element in localization, with regard to varieties of speech defects. His own opinion, which he had held for several years past, was that the areas which had been hitherto suggested were too much restricted. He thought the whole mass of the information which had been received had been argued about on too narrow a basis, because the localization of the various functions had always been assumed to be too microscopical. Thinking out the matter on purely psychological grounds, knowing something of the localization of the motor function of the brain, and adopting Hughlings Jackson's views as to the representation of particular areas, he could not believe that such an important function as that of speech could be localized in any small area of the brain; it must require a vast representation. He believed that the area of the left side of the brain devoted to speech stretched from the foot of the third frontal convolution in front to the angular gyrus behind; and from the lower limits of the supramarginal convolution above to the middle and probably the inferior temporo-sphenoidal convolution below. This large area, including most of the island of Reil, he believed to be mainly devoted to speech (both internal and external) and intellect. He believed there were no sharply divided compartments in this area, where it could be said that this or that part of the cortex was solely devoted to particular elements of the speech function, but he did believe that in the main the hinder end of this area was mainly one in which visual impressions were received and elaborated into such a form that they were ready to be received in consciousness and interpreted as speech; and that in the same way the temporal convolutions were mainly devoted to re-representing auditory impressions as speech; whilst the frontal end was chiefly concerned with the emission of speech in the form of words spoken and written.

Dr. Head had told of a variety of lesions and a variety of results. There was a suggestion—nothing more—that whether there would be one type of aphasia or the other, would be determined according to the intensity of the lesion, and not according to its localization. In this matter his experience was similar to that of the last speaker and others who had spoken that night. He thought

there could be no doubt that a lesion of the hinder end of the speech area would give different results from those of a lesion in the fore end. But he thought that in all these cases there would be a depression of intellect, that the whole intellectual capacity would suffer to some extent in whatsoever portion the speech area was damaged. And he agreed with Dr. Collier that the more sharply defined was the type of aphasia, the more certainly would there be a subcortical as well as a cortical lesion. He did not think there was any sharp line of definition between motor and sensory cortex, but that they were intimately intermixed, and that as one passed to the fore end of the brain it became more motor, and as the occipital end was approached it became more sensory (visual), while on reaching the temporal lobe it was mainly auditory in type. He did not doubt that Dr. Head had explained his own cases, in the main, correctly. But, there again, he agreed with Dr. Wilson that those cases were not, essentially, any better for the purpose of determining localization than were the types members had seen. He had seen cases of bullet wounds in which the brain had been exposed by operation, cases in which the missile had crushed through the dura and those which had suffered concussion effects through a slanting blow, and it had been difficult to define the limits of the lesion, either in the surface direction or in depth. He thought Dr. Head would agree that, though it was clear that the lesions in his cases were mainly cortical, yet to a considerable but varying extent they might be subcortical.

He did not yet know exactly what Dr. Head meant in regard to the type of theory of which Sir James Purves Stewart spoke. He (the speaker) thought the main question at issue as between neurologists to-day was as to whether there was an intermediate cortical "centre" through which impulses passed, whether they were elaborated as coming from the sensory side and were coded as they were passing out in the emissary form. He agreed that there was, as yet, no absolute proof that the visual impulses did not go directly into the main mass of the speech area, that they were entering into intelligence in such a form that one could say that at such a particular place they had been re-represented or integrated to a higher stage, so that they could then reach consciousness. But he felt very little doubt that the process of integration was going on; he thought it was operative in an area not sharply defined from the remainder of the speech area and that neurologists could use such a localization as had been worked out in the past very valuably from the point of view of localization of speech function.

Dr. HEAD (in reply) said he could not imagine a task more difficult than to be questioned by the various speakers and to have to answer them unprepared. He understood Dr. Collier to be in general agreement with the clinical aspect of what he (Dr. Head) had put forward. He could not understand why Dr. Collier said that in spite of the fact that the terms used were fundamentally incorrect, and "physiologically, anatomically, and psychologically impossible," Dr. Collier intended to keep to them—at least he would find it hard to replace them. That was the very reason Dr. Head had been bold enough

to try to replace them by something which would be more fundamentally correct, more physiologically adequate, more psychologically possible. In speech they were dealing with a high-grade psychical aptitude far above the level of sensation. This function demanded the integration of a number of other functions before it could be carried out, and in this way speech seemed to resemble it; each could be upset by lesions of the brain, which did not necessarily destroy the whole act, but destroyed it in part. The mere fact that speech could be disturbed in part showed that those areas of the cortex which were attacked by these various lesions were not all of equal value. He gathered from Dr. Collier that he considered most of the lesions which produced these disturbances affected either the entering or the emissary path—i.e., in the pure forms; but with lesions of the entering path they were not concerned with speech at all, but with a disorder of some aspect of sensation. On the emissive side such a lesion should produce a pure anarthria.

Proceeding to the discussion of syntactical aphasia, he would try to unite the two parts of Dr. Collier's statement together. In the first part of his discussion on syntactical aphasia, Dr. Collier had hit on the explanation he (the speaker) had given of its origin. If a man had taken too much alcohol his legs became ataxic; he struck against chairs and tables in his progression, and the repercussion on himself told him he had not proper control of his legs. But if at the same time his speech was disorderly, he did not know this through his somatic sensations, he knew it because he heard his speech to be wrong. Syntactical loss was produced by the fact that the man could speak, but had lost regulating power over the rhythm and balance of what he said. The actual words, like all words spoken in these disturbances of language, were the representative of the parts not affected. He was glad to find that, in this matter, Dr. Collier and he had hit upon the same explanation.

He was sorry to see that, later on, Dr. Collier used the terms "visual speech" and "auditory speech," as he (Dr. Head) did not know what they were; there was speech, but not visual speech and auditory speech. When a person was speaking, his actions were carried out above the visual and the auditory levels. In most cases of aphasia, image-formation was not definitely impaired. True, there might be a combination of loss of image-formation and loss of speech. One of the best cases on record was that which Stauffenberg worked out in v. Monakow's laboratory in 1913. This was certainly a case of aphasia combined with what Hughlings Jackson would have called imperception.

He would like to correct the statement that his patients were necessarily selected because he thought the lesion was cortical; with these wounds no one could be certain whether a lesion was cortical or subcortical. His object had been to see what were the actual forms assumed by destruction of speech—i.e., a high psychical function, in consequence of various organic lesions. It was impossible to suppose that the relation between organic destruction and the loss of psychical function stood in the relation of so much loss of cortex to so much disorder of psychical function. The effect of an

organic lesion of the brain on the functions of speech might be compared with the result on an electric light installation of destroying a varying number of the accumulators; the area of the brain supplied the vital force, which was the basis of the physiological energy which underlay this complicated psychical act. It might easily happen that it did not break up speech, but rather, lowered the general activity and vitality of the power of speech. As a fact, however, injury to one portion of the brain was more likely, under favourable conditions, to lead to the dissociation of speech in certain directions. But before attempting to decide the situation of the lesion which produced some specific disorder of speech, it was absolutely necessary to ascertain what the disturbance was. It was of no use trying to localize the position of the unknown on the surface of the brain. That was why he had kept away from all questions of localization at present; he wanted first to determine what function was disturbed, before putting forward views as to what lesion was likely to produce it.

Most of the speakers had accused him of being an empiric. He was delighted to hear it. The whole point in his papers was that he wanted to revive the English empiric philosophy dating from Locke and passing into medicine through Hughlings Jackson. The latter said, in a famous passage, "Put down what the patient does get at, and avoid all such terms as amnesia, &c."

The next point on which he wanted to insist was that these functions were not faculties; one speaker used the word "faculty" three or four times. "Faculties" came from mediaeval philosophy, and had now, fortunately, been got rid of in psychology. The use of such words as "general understanding," "aphasia," "amnesia," "memory," had been deprecated by Hughlings Jackson, who pointed out that there was no such thing as memory apart from things remembered, and no consciousness apart from conscious actions. The only possible way to find out what happened in consequence of an organic lesion was, not to use words such as "reading" and "writing," which were only *a priori* conceptual terms, but to find out what did actually happen. Had he been bold enough, he would have liked to have spoken of the "*x* group of functions," which broke up into the *a*, *b*, *c* and *d* groups. But he dare not do that. He had been obliged to give them names, and it was those names which were going to lead him to perdition; because everyone would settle upon them and think they all meant something he did not intend, and another set of conceptual terms would have been invented, to load up this unfortunate subject and obscure it further. There were no such things as "types" of aphasia. A great group of functions were employed in the acts which they called reading, speaking and writing, and it was these which split up in certain ways to produce the clinical forms of disordered speech.

Sir James Purves Stewart simplified the question by dividing speech affections into psycho-motor or apraxia, and psycho-sensory or agnosia. It seemed to him (the speaker) that this was a matter of words; he did not know what psycho-motor meant, and apraxia was only a convenient term

for certain aspects of defective cerebral activity. Neither did he know what "psycho-sensory" meant; the sensory side of speech would consist of sensations. When it was said that the psycho-sensory aspect of speech was agnosia, this was only saying, in Greek, that the patient did not appreciate what came to him from without. With regard to the cases described, it was extraordinary how anybody, working under the conditions surrounding Sir James Purves Stewart, in Gallipoli and elsewhere, should have been able to take such photographs and such elaborate notes. It filled him with admiration. But all the cases tended to have their value decreased because they were seen in the acute period, a period which in many cases extends over many months. It was difficult to say what specific form would be assumed afterwards by cases showing such a widespread lowering of vitality. Cases II and III appeared to have had verbal loss, with difficulty in spelling. If they could have been watched over a long enough period, he thought Cases II and III would be found to be verbal aphasics. No. IV seemed to be too diffuse to be at all definite, but No. V was a severe example of nominal aphasia.

Dr. Wilson seemed to think that aphasia and apraxia could be put together under one heading. Both were convenient words if they were not carried to definition. The moment one drove "apraxia" to definition one saw it did not exist. There were forms of apraxic action, which no one had described better than had Dr. Wilson himself; but when one used the word "apraxia" to explain loss of speech, it did not seem to be doing more than explain the most simple of aphasias. He wished to get rid of these *a priori* terms.

Dr. Stanley Barnes stated that the impression which had got about was, that localization had gone by the board. If by this was meant the localization of "alexia," "agraphia" and "aphasia," he was glad he had given the correct impression. By localization he understood that affections of certain parts of the brain were liable to produce breakdown of this group of functions in one direction rather than in another. The anatomical basis of that form of localization he hoped to put before the Section on a future occasion. He did not believe in localization as it was ordinarily stated; he did not believe in the localization of what was called motor aphasia, or sensory aphasia, because he did not believe in the existence of motor and sensory aphasia.

With regard to lesions being cortical or subcortical, no one would suppose that gunshot wounds were other than gross lesions, and the wonder was that after the shock had passed off any of them were found to have produced specific loss of function. Dr. Barnes laid stress on a general intellectual defect; but psychologists to-day did not believe in general intellectual defects. This could be seen in the case of memory. Jackson said there was no such thing as general memory; there were only definite things remembered. Speech was a form of intellectual activity; therefore in saying there was a defect of conditions which were responsible for speech, it was assumed there was a defect of intellect. But there was no such gross defect of intellect as was found even in the slightest case of dementia.

Section of Neurology.

President—Dr. ERNEST S. REYNOLDS.

Tabes: Its early Recognition and Treatment.¹

By E. FARQUHAR BUZZARD, M.D., F.R.C.P.

TWO CASES OF TABES.

IN October, 1912, I was consulted by a man who told me that he was 24 years of age and that he had suffered severe pains in his legs and slight pains in his arms for four years. He had seen various doctors, who had diagnosed neuritis, but had not been able to relieve him of his suffering. Further questioning elicited no other complaint in respect to his health except that he was lacking in energy and was easily tired on going upstairs. His description of pains led me to believe that he was suffering from tabes dorsalis, although he denied venereal infection.

Examination revealed no signs of any organic disease, with the single exception that his appreciation of pain below the knees, on the ulnar aspect of the forearms and on part of the thorax did not appear to be quite up to the standard of other parts. The eyes were normal in every respect and the reflexes those of a perfectly healthy man. He could toe-and-heel a line backwards and forwards without hesitation, and the closure of his eyes had no ill-effects on his equilibrium. On the completion of my examination I told him that he was suffering from syphilis of the nervous system, and then elicited a history of irregular sexual intercourse on one occasion seven years before. This had been followed by a "pimple," for which he was treated by medicine for a short period. At my request his blood was examined by Dr. Carmalt Jones, who found a positive Wassermann reaction.

Eight years have elapsed since the date of this examination and diagnosis, during which period the patient has been having antisyphilitic treatment at more or less regular intervals. Without going into great detail, I may say that he has had eighteen intravenous injections of salvarsan, kharsivan, or novarsenobenzol, two intramuscular injections of salvarsan, 460 mercurial inunctions, and a few courses of grey powder by the mouth. In other words, he has averaged two and half injections of salvarsan and between fifty and sixty mercurial inunctions per annum. The treatment has not been regulated by Wassermann tests, but the latter have been made on ten occasions, including the one already mentioned. The blood Wassermann reaction first became negative in January, 1914, fifteen months after the commencement of treatment. It became slightly positive in May, 1915, and again in September, 1917. On all other occasions the test proved negative. The cerebro-spinal fluid was examined in May, 1914, when it gave a negative Wassermann reaction and yielded a count of twenty-three lymphocytes per cubic millimetre. In January, 1916, the reaction was again negative and the lymphocytes numbered eight per cubic millimetre.

¹ At a meeting of the Section, held December 9, 1920.

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During these eight years the patient has been engaged in a strenuous business life with a very moderate allowance of holiday. He married in 1915, and is now the father of two healthy children. He plays a scratch game of golf and a game of tennis, with which he is quite content. In 1918 he was examined by a recruiting board and passed A1, the verdict being upset by an appeal board at my request. To-day the patient presents no physical signs of organic disease, although a careful examiner may still detect some of the analgesia which I observed at my first interview. He has never entirely lost his pains, but the latter have not interfered with his active life, and he has frequently enjoyed several months together of complete freedom. An occasional bout of pain is easily dispelled by a dose or two of aspirin or phenacetin. Recurrences are usually associated with undue fatigue or with some more or less serious anxiety.

This story raises some questions of interest, but before dealing with them I propose to recite another which may add value to the discussion.

In March, 1914, a man, aged 38, consulted me on account of severe pains in his arms and legs, from which he had suffered for six months. In other respects he was perfectly well, and he denied venereal infection. About five years previously he had been troubled with sore throat on two or three occasions, for which he had had his tonsils enucleated. On examination he presented no signs of organic disease, and I could not satisfy myself that his sensibility was in any way abnormal. The pains were those of tabes dorsalis, and an examination of the blood revealed a positive Wassermann reaction. In April, 1914, I gave the patient three intravenous injections of salvarsan, and from that time until October he took courses of grey powder by the mouth. The pains disappeared after the injections and the blood Wassermann reaction was negative in October. I advised him to continue with occasional courses of mercury, and I have recently ascertained that he has remained free from pain and in perfect health.

TABETIC PAINS.

In order to justify a diagnosis of tabes in the absence of physical signs it is necessary to state one or two facts about which there can be little disagreement. In the first place, the disease is one which attacks the afferent paths of the nervous system, and it is only reasonable to suppose that its earlier manifestations are of a subjective character—in other words, that complaints indicating a disorder of function precede those which are clearly due to structural defects. In the second place, it will be agreed that in a large proportion of cases of unmistakable tabes careful inquiry will elicit a history, often going back five, ten, or more years, of pains which have been regarded as neuritic or rheumatic in origin, and have not been associated with any other disability. Not once but a score of times have I asked a tabetic patient whether he has suffered from pains. After repeated denials I have altered the wording of my question and inquired for rheumatism. "Oh, yes, I have suffered from rheumatism for years." "What do you mean by rheumatism?" "Why, sharp, shooting pains in my limbs." This conversation shows how little the patient has associated his pain with the disability for which he is seeking advice, and incidentally how few patients understand the language they speak.

Granted that pains can be, and often are, the earliest signs of tabes, can they be distinguished from pains of other origin? I would answer this question in the affirmative and even go so far as to say that the pains of tabes described by a patient who is able to translate his feelings into intelligible language are

quite pathognomonic. The fact that they are called lightning pains and that patients often say that they shoot up and down their legs has been responsible for a very general misunderstanding of their true character. When the patient states that they shoot up and down the limb he does not mean that each pain shoots from the hip to the foot and vice versa. He means that during an attack he may have pains first in the thigh and a few minutes later in the foot. If he is asked to describe them in greater detail he will inform you by gesture and by word that these pains have an axis, so to speak, at right angles to the surface of the limb. They stab like a knife or a darning-needle going in, or they resemble the effect produced by taking up the flesh, pulling at it, and letting it go again. Further, the pains come not singly, but if not in battalions at any rate in platoons. They are rapidly repeated, several occurring in the course of a second or two, followed by a lull of longer or shorter duration. Bouts of paroxysms may last for a few hours to a few days and then cease for a time. Favourite sites for these pains are the heel, the inner aspect of the shin, and the inner aspect of the knee. The area within which they repeat themselves is small, described by the patient as the size of a crown-piece, or no bigger than the palm of the hand. Between the frequent paroxysms these areas are often tender to light touch, so that the patient does not even like the contact of his clothes. Many patients are quite certain that pains may be provoked by a cold draught, by a change of weather, or even by a glass or two of beer. Others are equally sure that the responsibility lies with fatigue or anxiety. In the early stages of the disease pain rarely occur during active exercise, but later on walking may be brought to a full stop by a sudden and overpowering paroxysm.

Before leaving the subject of pains let me make it quite clear that those I have described are not the only ones suffered by tabetic patients. There are deep, gnawing, aching pains in the bones, and others which have not the same diagnostic value. Let me also emphasize the fact that tabetic lightning pains must be recognized by their characters and not by their severity. Many patients confess to what they call "niggling pains," trivial in respect to suffering, but identical in nature with the lightning type.

It would be surprising if there were not other subjective phenomena in early tabes, and attention may be drawn to the not uncommon complaint that hot or cold water has become disagreeable or unbearable, that the patient is obliged to have his bath at a temperature which is described as tepid. Not that the hot or cold water provokes pains, but that it gives rise to a sense of great discomfort. This often applies to the whole surface of the body, although pains may be absent or confined to the lower limbs. Similarly it is not uncommon to hear that the fingers are numb when it is quite impossible to determine any disorder of sensibility by tests. This, of course, is not pathognomonic of tabes.

TREATMENT.

The necessity for advising antisypilitic treatment of tabetic patients is not now so urgent as it was a few years ago, but it may be doubted whether the principles of this treatment are yet adequately recognized. We are all asked: "How long must I go on with treatment before I am cured?" For many years my answer has invariably been, "For the rest of your life." I am never consulted about a primary chancre, but if I were my advice would be the same. It cannot be denied that we are not and never have been in a position to tell a patient that he has been cured of syphilis, and, as neurologists, we are

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now constantly seeing tabetic patients who have been cured of syphilis by the arsenical compounds, just as fifteen years ago we saw those who had been cured by mercury. I maintain that the only honest advice we, as medical men, can give to patients suffering from any syphilitic disease is to the effect that they should continue to have periodic courses of treatment for the rest of their lives. Tell them that prevention is better than cure, and that they must regard this precaution as a method of insurance. In my experience so many victims of tabes and other syphilitic nervous diseases have allowed valuable time to slip by owing to negative Wassermann reactions that my confidence in this test as a method of regulating treatment is shattered.

CONCLUSION.

Is there any lesson to be learned from the story of the two patients which I have presented to you? The first man was infected with syphilis fifteen years ago, and has undoubtedly suffered from tabes for twelve years, during eight of which he has been under treatment. To-day he would be passed as a first-class life by any medical officer of an insurance office who did not know his history. It would be unwise and unjustifiable to say that he is cured, but it is difficult to believe that the natural progress of his disease has not been arrested. And it must be remembered that he wasted four years before his symptoms were recognized and treated. The second patient was more fortunate. Only six months were wasted, and the result of treatment was rapid and lasting, judged by the fact that he has now enjoyed six years of freedom from any kind of symptom. These are not the only cases of the kind which have come under my observation, but I regret to say that it is a rare experience to be asked to see a patient suffering from tabes whose symptoms have not been long-standing.

It is obvious that the value of these observations depends on the reliance which can be placed on the description of pains given by patients, and on the criterion the description affords for purposes of diagnosis. In many cases the description is vivid and easily recognized. In others it can only be elicited by patient cross-examination, avoiding the employment of leading questions. After many years of critical study of this problem I am convinced that the lightning pains of tabes are, for practical purposes, pathognomonic, and that they can and should be recognized before they are many months old. Treatment initiated before physical signs are apparent is not only possible in many cases, but is likely to be attended by good results if persevered with to the end of the chapter.

Section of Neurology.¹

President—Dr. ERNEST S. REYNOLDS.

Case for Diagnosis: possibly Tabes Dorsalis.

By H. H. TOOTH, C.B., C.M.G., M.D.

M. D., FEMALE, aged 35, single. Family history *nil ad rem*. Ten years ago transient attacks of loss of vision, which recurred several times during the next four years; none since then. Five or six years ago began to have trouble in walking, tendency to walk quickly and fall forwards; in hospital in 1917 for ten weeks; improved for about twelve months, then trouble began to recur and has gradually got worse since. Twelve months, some hesitancy in micturition. Six months, girdle pain on the right side. Twelve months ago legs gave way and she had complete right hemianæsthesia and hemianalgesia for a fortnight. At Christmas, 1920, had anæsthesia and analgesia of left lower limb, lasting six weeks.

Present state: Optic discs physiologically pale; pupils react to light sluggishly; nystagmus in horizontal direction on extreme lateral movement, especially to the right and in vertical direction on extreme upward movement. Sensibility to pin-pricks slightly diminished over right half of body and slightly less keen than normal all over. Deep muscle-pain sense in legs absent. Touch: localization of touch, passive movement, stereognosis good. Power slightly diminished in legs, and legs hypotonic. Co-ordination fairly good, slight tremor in hands on finger-nose test. Arm-jerks, knee and ankle-jerks absent; right abdominals present, left absent; right plantar slight flexor, left extensor. Gait unsteady. Rombergism present. Wassermann in blood and cerebro-spinal fluid negative.

Remarks.—The case presents a strikingly complete picture of tabes dorsalis in a single woman; but in the absence of any history, family or personal, or any evidence, of syphilis one is reluctant to accept that diagnosis. It is possible that it may be a symptomatic simulation of that clinical picture, by disseminate sclerosis. Time alone will solve the problem.

Case of Acute Myelitis at about Seventh Dorsal Segment, with Optic Neuritis.

By JAMES TAYLOR, C.B.E., M.D.

(Shown by Dr. SHEPHERD.)

G. S., FEMALE, aged 23. Awoke on July 15, 1920, with pain over the left eye; the sight went in that eye by the next morning and she had pains in the legs and back during the night. She was feverish and had headache the next day and the right eye became similarly affected, so that by the next

¹ At a Clinical Meeting of the Section, held at the National Hospital for the Paralysed and Epileptic, Queen Square, February 10, 1921.

day she was absolutely blind and was completely paralysed in both legs with analgesia and anaesthesia up to the waist, and retention of urine and faeces. Legs were quite spastic for ten days and then the spasticity gradually went off and the legs became quite flaccid. Eyesight gradually improved, so that she can see quite well now. From October, 1920, incontinence of urine.

Physical examination: Optic discs pale, especially the left, showing evidence of old optic neuritis. Complete paralysis of legs below waist (very slight flicker in toes only). Complete loss of sensation to cotton wool, pin-prick, temperature, from below the waist; the loss to pin-prick extends an inch higher than the loss to cotton wool, and in the area between these two upper levels heat and cold are not appreciated. Arm jerks normal, knee and ankle-jerks, abdominals and plantars absent.

Cerebro-spinal fluid: albumin 0.6 per cent., N.A. strongly positive, no cells seen, Wassermann negative. Wassermann in blood negative.

Case of Intracranial Pressure (?) Tumour; Recovery without Operation.

By JAMES TAYLOR, C.B.E., M.D.

(Shown by Dr. SHEPHERD.)

E. F., FEMALE, aged 28. At the age of 16 suffered with headache and loss of power in the hands and legs, especially the right side. Headaches became very severe and continuous and were accompanied by vomiting. She was admitted to the hospital in October, 1904. She had then marked papilloedema, but the headache and vomiting subsided soon after admission and the power gradually returned to the limbs. About three months after admission she was able to be up and walking, but the arms and legs got weak again: she was very unsteady and had to go back to bed, so that she was still very weak about August, 1905. She gradually improved again and was able to be about in six months. From that time until eighteen months ago she had been fairly well, with the exception of some tremulousness and weakness in the legs, especially in the right. During the last eighteen months the right leg has become weaker. No visual or sphincter troubles; only a very occasional headache; some tingling in the hands and feet during the last two months. Optic discs normal; (?) slight nystagmoid jerking on looking to the right; otherwise cranial nerves normal. Movements of right leg much diminished with slight talipes equinus on right side. Abdominal reflexes active and equal, knee-jerks and ankle-jerks active and equal; clonus, right plantar inactive, left flexor. Walks dragging right leg.

Case of Friedreich's Ataxia.

By JAMES TAYLOR, C.B.E., M.D.

(Shown by Dr. SHEPHERD.)

F. L., MALE, aged 19. No family history. Patient has one sister and one half-brother. Patient began to be unsteady in walking at age of 7; says he always fell forward; this gradually became worse, legs weak and muscles gradually wasted, so that by age of 14 he was confined to a chair. No

change during the next three years, but has been feeling stronger during last two years. Deformity of the spine, said to have developed during last three years. Pes cavus present since childhood. No alteration noticed in speech.

Patient is rather facile boy of 19, not keen mentally, bodily nutrition bad, arms wasted. Nystagmus present, especially to right. Also slight shaking of head; speech slow and of scanning variety; motor power diminished in lower extremities and in trunk, with wasting in legs; no spasticity. Slight pes cavus, slight intention tremor. Deep reflexes absent; plantars extensor. Slight kyphoscoliosis. Wassermann negative in blood and cerebrospinal fluid.

Case of Lethargic Encephalitis.

By JAMES COLLIER, M.D.

M. B., AGED 20, was seized with intermittent frontal headache on December 26, 1920. On the following day her eyes became crossed, and she saw double and became very sleepy and ceased to talk or to move spontaneously. She had considerable trouble with retention of urine. She was not laid up, and attended her doctor regularly. She has remained in this condition since, and during this time her memory has been good; she has obeyed orders promptly and replied to all questions promptly and correctly. Her facial and bodily expression is one of complete statuesque immobility, in lying, sitting, or standing. She will remain in any awkward attitude in which she is placed for long periods. She never moves spontaneously except in response to the more urgent calls of nature. She does not turn over in bed. She presents no emotional expression, positive or negative. She never speaks spontaneously. She obeys every word of command at once and correctly. She answers every question at once and correctly, and gives a correct and detailed account of her illness if she is catechized. In response to the usual salutation she answers always: "I feel quite well, thank you." There is severe bilateral ptosis which is diminishing. Complete internal ophthalmoplegia with large pupils. The axes diverge in vertical parallelism. Downward movement absent. Upward movement almost absent with quivering. Lateral movements of about 2 mm. with quivering. Vision very poor, but no change in media or fundus. No brain-stem paralysis.

On admission to St. George's Hospital, January 12, 1921, the left abdominal reflex was diminished and the left plantar was extensor. Now the abdominal reflexes are equal and the plantars are flexor. Some fibrillation was noticed in the right anterior tibial and peroneal muscles.

Under observation she has developed dropped toes and dropped in-turned foot on the right side with severe weakness of the external sciatic group of muscles, with increased tendon jerks.

The points of interest are the peculiar clear but immobile mental state and the condition of the right foot.

Case of Amyotonia Congenita.

By JAMES COLLIER, M.D.

V. C., FEMALE, aged 4½. Child born normally. Difficulty in sitting up; has never walked, and only began to crawl ten months ago. Pain in foot on being stood up. Otherwise no complaint; no fits nor injuries. Bright child,

teeth and talking at normal age. Ten months ago had headache, vomiting and screaming for three days; otherwise no illnesses. Clean in habits. Father died of consumption. Three siblings dead—one of meningitis, at 5 years; two at 4 and 3 months, having been sickly from birth: one alive, aged 13, and healthy.

Child of poor development, good intelligence, and unusually good-tempered and uncomplaining. Stands with support, hips and knees being flexed from contractures of muscles, and feet slightly plantar-flexed. Muscles of lower limbs only of poor tone and somewhat wasted, but of moderate power. Bears stretching of contracted muscles well, and has improved considerably since admission. Knee and ankle-jerks present. Abdominal reflexes present. Plantars flexor.

Case of Graves' Disease: (?) Paralysis Agitans.

By JAMES COLLIER, M.D.

M. B., FEMALE, aged 26. Lump on throat noticed eight years ago; has got smaller, if anything, during past six months. Palpitations and shaking for six months. Perspiring for two months. Menses regular—scanty. No exophthalmos. Fine tremor of hands. Coarse rhythmical tremor of feet, stopping for a time by voluntary effort and then beginning with renewed force; lateral as well as up and down movement. Sometimes general tremor of body; some of tongue. Attitude and mask-like face resembling paralysis agitans. Reflexes normal.

Case of Encephalitis Lethargica.

By E. FARQUHAR BUZZARD, M.D.

B. D., aged 43. Family history: Father died of carcinoma of liver; brother has neuritis in his arms. Previous history: Good, but patient "nervous."

September, 1920: Pain in both legs, which makes walking difficult, but soon improved.

November, 1920: Pain in right knee and weakness of right ankle; no numbness, but foot gets cold. No complaint of arms. Right foot "dropped" three weeks.

January 5, 1921: Examination—Fibrillation of deltoids, pectorals, and triceps; more on left side. Weakness of sterno-mastoids and of above muscles. Slight weakness of extensors of wrists. Fibrillation of right quadriceps and wasting of all muscles of right leg; foot dropped. Some weakness of left leg; much weakness of right, especially of extension of foot and toes. No incoördination. Sensation: Pain in right calf; deep pressure of muscles of legs painful; some loss of pin-pricks and heat and cold inner side right leg. Reflexes: Arm and knee-jerks increased, right ankle-jerk absent, left present, no clonus. Abdominals brisk. Plantars: right flexor, left extensor.

Case of Echinococcal Cyst of Left Parietal Region.

By PERCY SARGENT, C.M.G., D.S.O., F.R.C.S.

M. E., AGED 15.

April, 1920: Weakness of right hand, progressing to whole arm.

July, 1920: Peculiar feeling in right arm and face, starting in fingers and followed by vomiting.

September, 1920: Similar attack.

October, 1920: Right foot caught in walking.

December, 1920: Optic neuritis noted.

December 25, 1920: Pain in left frontal region; noises in ears: drowsy; vomiting; some defect of speech.

January 2: Slight hesitancy of micturition.

On admission into hospital, January 4, vision $\frac{5}{5}$, papillœdema, right + 6D., left + 5D. Right lower face weak, right hemiparesis arm and leg, slight loss of sense of position, localization of touch, and recognition of objects on right limbs. Pin, cotton wool, and vibration less distinct on right. Reflexes: Deep, increased on right, abdominals less active on right; plantars, right extensor, left flexor.

January 14, operation: Large cyst removed reaching surface just behind left fissure of Rolando, contained 60 c.c. of fluid, diameter about 6 cm. Pathologist's report: Echinococcal cyst; fluid, albumin 0.015 per cent., sugar a trace; chlorides 0.57 per cent., specific gravity 1.006.

After operation a few fits with twitching of right face, tasting movements of lips. Rapid general improvement. Subsidence of papillœdema.

Case of Spinal Tumour removed by Operation.

By PERCY SARGENT, C.M.G., D.S.O., F.R.C.S.

A. W., AGED 42.

June, 1918: Pain left side round iliac crest.

June, 1920: Operation on left kidney, pain slightly less, but soon recurred.

Three weeks later numbness of both legs, left foot dropped, pain reached left foot; right foot also soon weak and painful. Slight hesitancy of micturition.

Examination: Spine not tender, but sitting up painful. Spasticity of both legs; some wasting; fibrillation of hamstrings and calf muscles. Spastic and unsteady gait. Reflexes: Knee-jerk very brisk; ankle-jerk present. Plantars: Double extensor. Abdominals absent below umbilicus. Sensation: Pin-prick lost; L. 2—S. 2 R.; D. 9—S. 2 L.; sense of passive movement in toes lost. Cerebro-spinal fluid: Yellowish fluid coagulating solid in tube; cells absent; albumin 3.7 per cent. Wassermann reaction negative.

Operation, November 11, 1920: Tumour seen and felt through dura opposite cut arches of D. 11 and theca opened without wounding arachnoid; tumour sub-arachnoid, soft and encapsuled on posterior and left lateral aspect of cord; removed and theca sutured.

Pathologist's report: Myxomatous tumour with clumps of endothelial cells.

Case of Optic Atrophy from Neuritis and Gastric Attacks.

By S. A. KINNIER WILSON, M.D.

W. C., AGED 56. Family history: Father died of cancer. Past history: Syphilis at 24.

1898: Sight impaired, treated at Moorfields in 1901 with mercury.

1902: Pain in stomach two hours after food, relieved by vomiting, improved since 1915 until recently. No unsteadiness of walking and no sphincter disturbance.

Present state: Visual acuity: Right, $\frac{1}{50}$; left, $\frac{1}{60}$; on looking to right of fixation point, at that point vision almost nil. Fields: Loss of upper half and general constriction, with central scotoma. Fundi: Old atrophy. Argyll Robertson pupils. No ataxy. Deep pressure of calves very painful. Deep reflexes absent. X-ray suggests cicatrix from old ulcer or growth of stomach with delay in emptying of stomach. Wassermann reaction: Negative in blood. Cerebro-spinal fluid: No increase of cells, globulin in cerebro-spinal fluid. Blood count: Red cells, 3,700,000; hæmoglobin, 70 per cent.; white cells, 10,500.

Case of Paralysis Agitans following Malaria.

By S. A. KINNIER WILSON, M.D.

H. C., MALE, aged 35. Malaria in England in 1918; blood tested at special malaria hospital (Connaught Hospital). A month later had "kicking" and twitching movements of left side, which became less noticeable after May, 1919.

In December, 1919, had weakness of left side and some slight stiffness of both hands. He began to stoop and to have difficulty in turning over in bed. By May, 1920, his right leg was also stiff.

August, 1920: Tremor, chiefly of right hand, slowness of speech and difficulty in opening mouth.

Examination: Slight weakness of left lower face. Spasm and rigidity of sterno-mastoids and trapezii. Tongue deviates to right. Mask-like face. Rigidity of trunk and proximal limb muscles. Pill-rolling tremor of hands. Paralysis agitans attitude and gait, with festination and retropulsion.

Case of Epilepsy with Acromegaly and Unilateral Tumour.

By J. TYLOR FOX, M.D.

W. G. O., MALE, born November 27, 1895. Nothing neuropathic recorded in the family. This patient's history and present condition may be classified under three headings: his epilepsy, his unilateral tremor, and his dyspituitarism.

Epilepsy: First fit at fifteen months, second three or four years later; after that about every three months. Since admission to Lingfield Colony eight and a half years ago, he has had attacks of petit-mal every two or three months with epigastric aura, loss of consciousness without spasm lasting two or three seconds in all, also three major fits in the last two years.

Neurological signs: Has had tremor of the left arm and leg "as long as he can remember." The tremor is continuous, apparently unaffected by voluntary movement, coarse, averaging five or six a second, and most marked in, if not confined to, the muscles about the large proximal joints—i.e., the shoulder, hip, knee and elbow. It ceases during sleep. The left upper arm is $\frac{3}{4}$ in. less in circumference than the right. The forearms, thighs and calves appear to be equal on the two sides. Reflexes, superficial and deep, give a normal response, though those on the left side are rather slower than on the right. Dynamometer readings 110 each side. No vasomotor differences between left and right side. No interference with sensation. No tremors of face, but coarse tremors of tongue. Optic discs, normal. Field of vision by rough perimetric tests, normal.

General signs: Curvature of spine said to have been first noticed at 15 months and attributed to rickets. Teething is also said to have started at 15 months, walking and talking at 18 months. Skeletal changes most marked in skull and spinal column. Cranium tilted backwards on the facial portion of the skull. Superior and inferior maxillae, large, especially inferior. Teeth pitted and grooved, and in upper jaw separated from each other. Nostrils, large and broad. Supra-orbital ridges well developed. Eyelids, thick. Tongue, large. Well-marked kyphosis with scoliosis to the right in dorsal region. Lordosis in the lumbar region. The skiagram taken at the National Hospital, Queen Square, of the skull of this patient quite negative. The bones of the skull are normal in appearance, the sella turcica is of about normal size, its outlines can be well seen; the posterior clinoid processes are quite distinct, and the cavity does not encroach on any of the fossae in front of it at all. As far as the skiagram goes, there is nothing abnormal to be made out. Right testis undescended and removed some years ago. Left testis very small. Thyroid not palpable. "Has never had a headache in his life." Temperature 97° to 98° F. Systolic blood-pressure, 110. Urine, daily quantity 49 oz., no sugar, no albumin. No diminished sugar tolerance. Patient is of fair intelligence, but his memory is poor.

Case of Torsion Dystonia.

By JAMES COLLIER, M.D.

(Shown by Dr. BLANDY.)

H. R., AGED 8, male. History: Six months after an attack of diphtheria (aged 5) involuntary tonico-clonic movements of an extensor type developed, with, in addition, perverse voluntary movements of the hands. The condition has shown marked remissions, but with each exacerbation has become more intense and more extensive. First noticed in the right arm, with "loss of use of the hands," the movements gradually involved the neck, face, tongue, then left arm, trunk, and finally, in the severest stage, the legs.

February, 1920: After being knocked down by a bicycle, there was a history suggestive of a tonic fit, followed by an exacerbation of extreme degree, associated with difficulty in eating, drinking and sleeping, and in starting the organic reflexes, owing to the excessive movements. He could only sleep on his face, head extended, right arm tucked in behind his back.

Past history: Nothing abnormal till aged 5; since then he has stopped growing, and has had an intermittent morbilliform rash.

50 Russell: *Cholesteatoma in Ponto-cerebellar Angle*

Family history: Father has "bronchial asthma." Sister had chorea after rheumatic fever, maternal grandmother, mother, aunt, two uncles, had enlarged thyroids (the aunt died of Graves' disease).

Physical signs: Small for age, intelligent; normal cranial nerves, sensation, reflexes. Wassermann reaction negative in serum and cerebro-spinal fluid.

Motor system: Hypertrophy of muscles most in spasm. Hypotonia during relaxation—no tremor nor ataxia, good power. Voluntary fine movements of hands awkward and slow. Hands in posture of flattened fists. Intermittent clonico-tonic, tic-like, bizarre, involuntary movements, i.e., extension of head and shoulders with protrusion of tongue, &c. Extension of right arm with over-pronation of wrist, &c.

The child is at present date in a state of remission.

Cholesteatoma in Ponto-cerebellar Angle.

By J. S. RISIEN RUSSELL, M.D.

(Shown by J. G. GREENFIELD, M.B.)

H. M., AGED 27. History: Staggering gait, six months; left-sided deafness and headache—one month. Handwriting shaky, and difficulty in swallowing, a few weeks.

On examination: Papillœdema right and left. Coarse nystagmus to left, fine to right. Progressive nerve deafness on left side. All deep reflexes over-active. Double ankle clonus. Plantars upwards (Babinski) right and left.

Post-mortem examination, three months after admission: Large cholesteatoma of left ponto-cerebellar angle, passing over the side of the pons under the basilar artery. Eighth nerve flattened, and internal auditory meatus enlarged and containing a prolongation of the tumour.

Colloid Ball-like Tumour in Third Ventricle, immediately over the Infundibulum.

By J. S. RISIEN RUSSELL, M.D.

(Shown by J. G. GREENFIELD, M.B.)

J. G. C., AGED 36. History: Headaches, worse when tired, sixteen months; diplopia, two weeks before admission. No vomiting.

On examination: Slight papillœdema right and left; diplopia on looking to extreme left, from paresis of left external rectus. Left facial paresis. Motor and sensory systems normal except for coarse tremor of outstretched hands. Reflexes: All normal.

One week after admission he had several "fits" in which he rubbed the back of his head and was "queer in his manner." He remembered nothing of them afterwards.

Post-mortem examination, two weeks after admission: Ball-like encapsuled tumour in third ventricle, causing hydrocephalus of both lateral ventricles. It is extremely tough after hardening in formalin, and feels like a solid rubber ball. Microscopically it is composed of colloid with a fibrous tissue capsule.

Section of Neurology.

President—Dr. ERNEST S. REYNOLDS.

Report on a Case of Myoclonic Encephalomyelitis of Malarial Origin.¹

By M. G. MARINESCO,

Professor of the Faculty of Medicine, Bucharest.

(Communicated by Sir FREDERICK MOTT, K.B.E., M.D., F.R.S.)

EPIDEMIC encephalitis, the existence of which was at first denied by certain authors, has ended not only in establishing its existence but also in invading the domain of a large number of organic diseases, as is shown by the report of the Local Government Board and the observations of French authors, notably those of Netter. We admit, and we are right in doing so, that the localization of the virus in different segments of the central nervous system can produce the clinical aspect of Parkinson's disease, hebephrenia, catatonia, chorea, myoclonus, &c. It is evident that even if epidemic encephalitis can simulate in a striking manner Parkinson's disease, as proved by Longues, Sicard, and Pierre Marie, one will always be able to find differences between the signs of the "Parkinsonism" of encephalitis and true Parkinson's disease, as Pierre Marie and Mlle. Levi have shown. As a matter of fact, in spite of the apparent resemblance between "Parkinsonism" and Parkinson's disease, the mode of onset of the former, the cause of the affliction, and the character of the symptoms permit us easily to distinguish the one from the other.

Furthermore, as our knowledge of the disease and of the conditions which produce it advances, we shall find with certainty that it is confused with other pathological conditions which do not belong to it, as for example hysteria (Georges Guillain, personal observation), tubercular meningitis, even the myoclonic form of encephalitis, to which von Economo and Sicard have attracted attention, can be simulated by hysteria and different infections, amongst which should be included malaria.

I propose in this paper to bring anatomico-clinical proof in favour of this opinion. I will give first of all a detailed account of my observations of the disease and of lesions which we have found in the nervous system, and will then state the lessons which can be learnt from our anatomical and clinical observations.

The case was that of a woman, aged 26, who was taken ill on September 3, 1920, suffering from fatigue, anorexia and fever of an indefinite type. She remained in bed for two weeks, and as her condition grew worse she entered a hospital, where she remained for only a few days. At this time she was feverish and unable to walk, and one noticed that she had slight convulsive

¹ At a meeting of the Section, held May 12, 1921. This paper will also be published in *Brain*, vol. xliv, with illustrations.

movements of the limbs and of the face. On September 27 she was transferred to our wards, and we noticed that the skin was pale, and that she could neither walk nor stand up. Speech was difficult and dysarthric. While lying on her back one noticed in the upper limbs almost continuous involuntary movements, accentuated at the extremities. These movements showed themselves in the form of rapid oscillations, which consisted of flexion and extension of the fingers or abduction and adduction, whilst in the arm and forearm the movements were of a more myoclonic type without displacement of the limbs. From time to time the movements of the upper limbs were quickened, and were transmitted to the trunk, which was agitated by contractions rhythmical in character. On the side of the abdomen there were sharp contractions having the same rhythm as the respirations (20 per minute). Respiration was regular but superficial, and at times the patient took deep inspirations. There were rapid lateral movements of the head, and at the same time rhythmic movements of the jaws, the lower jaw coming together in such a manner that there was a gnashing of teeth. The eyes were moved laterally and vertically so that they appeared as if they rolled in the orbits. The eyelids fluttered rapidly, the facial muscles twitched, and the nostrils dilated and contracted.

In the lower limbs the involuntary movements consisted of rapid sharp contractions localized to the thigh muscles. Movements were less frequent in the muscles of the leg. The big toes were in a state of continuous extension, though from time to time they also showed rhythmic movements.

To sum up, the majority of the voluntary muscles were subject to involuntary movements so rapid that one could not count them; they were myoclonic in appearance, more accentuated in the extremities of the upper limbs, in the jaws, and in the orbit. Further, the muscles of the trunk showed movements, larger in size and less frequent, which were from time to time transmitted to the arms. Beside these movements, which were accompanied by slight displacement of the segments in which they took place, one noticed very rapid muscular contractions.

The tendon reflexes of the limbs were abolished; the pupils were equal and reacted to light and accommodation; the cutaneous reflex of the abdomen and even the plantar reflex were absent.

At the level of the right parotid gland was a swelling of considerable size which was painful.

The pulse was so rapid that it could not be counted at the wrist; the femoral pulse beat at 150 to the minute.

The patient had a slight rigidity of the neck and a suspicion of Kernig's sign. The limbs showed no contractures. The temperature was higher in the morning (38°6' C.) than in the evening (37°4' C.).

On the day of entry into hospital (September 27, 1920) we wished the patient to get up for the operation of lumbar puncture and to seat herself in a chair, but during this manoeuvre she fell into a kind of syncope, the tremblings ceased and her arms fell inert beside her body.

When she had been placed upon the bed it was noticed that her pulse was imperceptible and that respiration had apparently ceased.

Artificial respiration was performed and her respiration was restored, although the pulse remained very feeble. Presently the tremor reappeared little by little and in a few minutes regained its previous intensity.

During the day and night the patient was in a state of delirium.

Lumbar puncture, carried out in the lateral position, showed ten lymphocytes by division (Nageotte) and the blood an intense mononuclear leucocytosis.

The urine was brown and on boiling a thick cloud of albumin appeared. Vidal's reaction and the Weil-Felix test were negative.

On September 28 the temperature rose to 39° C., and the state of the patient became much worse. Respiration became noisy, and she died suddenly at 2 p.m. Just before her death the involuntary movements described above disappeared.

As the patient died almost suddenly we were not able to pursue all our investigations for the purpose of arriving at a correct diagnosis, but from the clinical aspect, the slight fever, and the indefinite lymphocytosis, we thought that we had to deal with a case of epidemic encephalitis of myoclonic form; but examination of the blood, followed by the study later of the alterations in the central nervous system, revealed our mistake. In fact there was revealed in the blood, in addition to the lymphocytosis, the presence of hæmatozoa and even of crescents.

On macroscopic examination the brain had already attracted our attention by its greyish coloration, and besides one saw here and there, in addition to the hyperæmia, punctate hæmorrhages in the cortex, the corpus striatum, and especially in the grey matter of the spinal cord. The meninges were unaffected, the cerebellum was hyperæmic, and the lateral ventricles were slightly dilated. The parotid gland on the right side was congested and showed signs of parenchymatous infiltration. The long narrow vessels which cross the cortex to enter the white matter were dilated and showed, for the most part in their adventitial sheath, a considerable number of lymphocytes, plasma cells, and some mononuclear leucocytes. Here and there, in the track of precapillary vessels and venules, colonies of plasma cells and fibroblasts were seen, and a similar infiltration of the adventitial sheaths of the vessels was visible in the white matter. Small vessels cut across contained in places a large number of lymphocytes and occasionally also some pigmented mononuclear cells.

In general the endothelial cells of the veins, as those of the capillaries, were swollen and sometimes even detached.

The small meningeal vessels were congested and in their sheaths a certain number of lymphocytes and mononuclear cells were recognized.

Hæmorrhages were not the rule. It was quite exceptional to see extravasations in the parenchyma, but hæmorrhagic streaks, which we saw in the spinal cord and of which I will speak later, affected also the cerebral cortex. Nevertheless I encountered some small hæmorrhages in the cornu ammonis, where we found a thrombus of leucocytes in a meningeal vein, forming a nodule which completely filled the lumen of the vessel.

In all regions of the cerebral cortex infiltrated capillaries and veins were found, dilated or filled with lymphocytes with some mononuclear leucocytes and plasma cells in addition. Throughout on the interior of the vessels red globules were seen which had lost their colour in proportion to the development of the parasite, and a capillary plexus was seen to be distended by these red globules which filled the lumen of the vessel.

On the surface of these globules some hæmatozoa, round in shape, were seen occupying them to a greater or less extent.

In the substance of the grey matter, as in the white matter, we remarked an hypertrophy and multiplication of neuroglia cells between the nerve cells in the neighbourhood of the vessels or near to them. In fact we were able to count up to ten neuroglia cells in the neighbourhood of the base and of the body of the deep pyramidal cells. The same neuroglial reaction existed in the neighbourhood of the small vessels of the white substance, but here

we noted a new growth of neuroglia of peculiar formation caused by the multiplication of these cells in a mass and resulting in a nodule which existed only in the deep white matter in the neighbourhood of the grey matter and which could be found in various sizes. The mean size of these nodules was $210\ \mu$ and $130\ \mu$ and they appeared to be formed almost entirely of neuroglial cells.

But there are two reservations which must be made at this point—first Nissl's method is not at all satisfactory for the study of the histological formation of nodules, and secondly that these new growths show a different structure in the brain, peduncle, pons, bulb and the spinal cord. One can, nevertheless, distinguish two species of them in the nervous centres, those of loose structure in which neuroglial cells predominate and others more compact in close contact with the vessels, made up of lymphocytes, mononuclear cells and fibroblasts, to which are occasionally added some plasma cells; at their periphery are a certain number of neuroglial cells, which appear to be increased in size but not multiplied to any great extent.

Employing the method of Cajal for neuroglia we have unfortunately not come across (in the sections which we have examined) the nodules we found by Nissl's method; but we stained by this method some sections from a case of exanthemic typhus, and noted that, contrary to the opinion of some authors, neuroglia played there a rôle which was entirely secondary.

Lesions almost analogous to those in the cortex were found in the optic thalamus, the lenticular nucleus and the caudate nucleus. In the peduncle the infiltration of the vessels and the hyperæmia were more marked in the grey substance than in the white matter and the infiltration of lymphocytes and plasma cells was confined much more to the walls of the veins than to those of the arteries. The cells of the substantia nigra were not particularly affected in spite of the fact that there were more capillaries filled with blood in this region.

On the other hand the same observations are applicable to the red nucleus. The capillary vessels of the corpora quadrigemina and of the grey matter of the peduncles and the promontory (protuberance) showed inflammatory reaction of the small vessels as intense as that in the cerebral cortex.

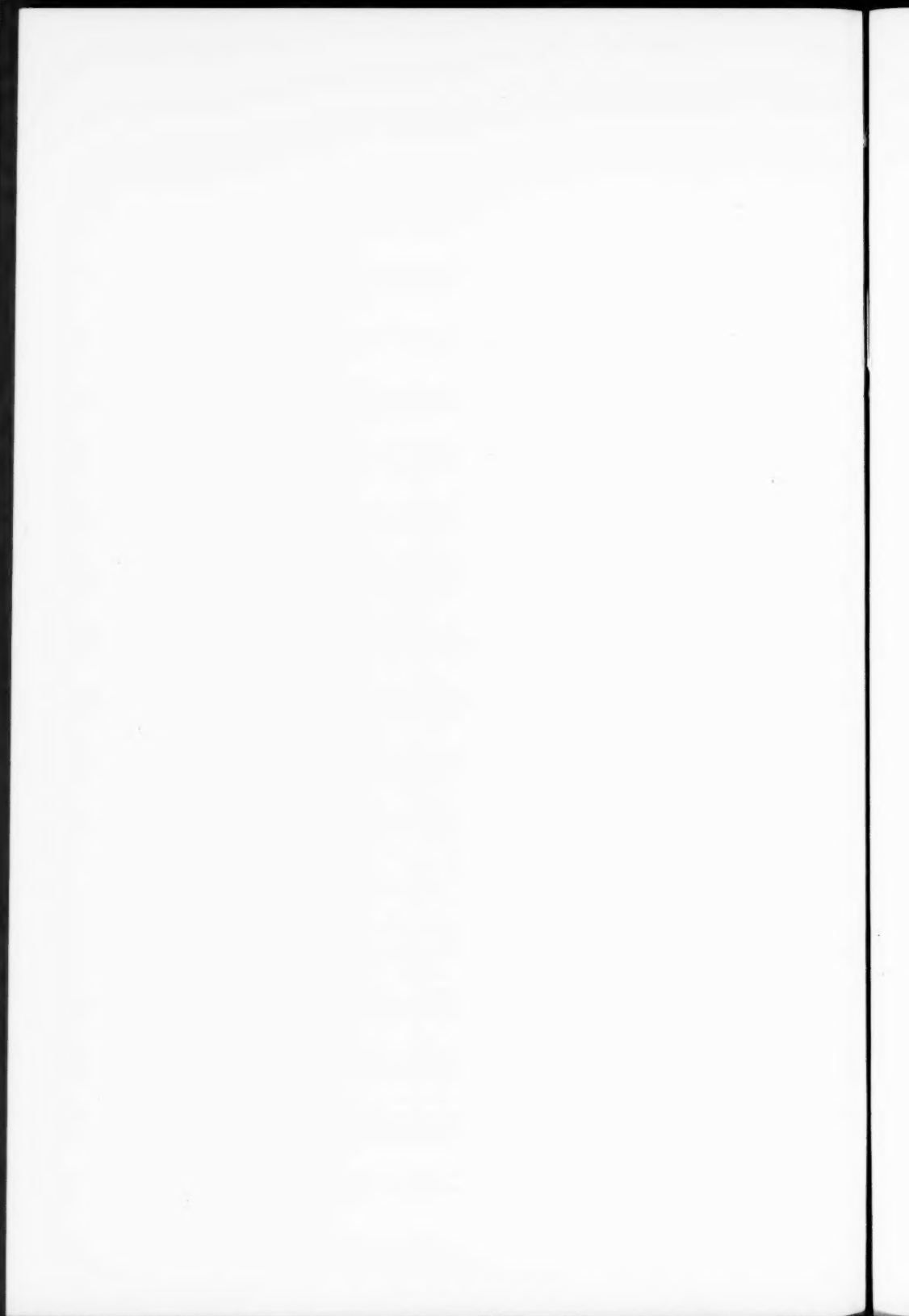
Very often the capillaries contained hæmatozoa few in number, but there were some of them in which nearly every red globule was parasitic. There were capillaries or precapillaries filled almost exclusively with lymphocytes, small or medium sized, arranged in one or two series. Less frequently these vessels were filled exclusively with polynuclears ending with one or two lymphocytes. In other vessels there was a mixture of lymphocytes and mononuclears and these can predominate.

The nodules which we have described in the white matter of the cerebral cortex are found more rarely in the peduncle. All the lesions which we have just noticed as being in the cerebral cortex, basal ganglia and peduncles are reduced to their simplest expression in the cerebellum when infiltration of the adventitia is exceptional, capillary congestion little marked and the number of hæmatozoa very limited.

We examined for the presence of hæmatozoa different glands such as the spleen, liver, suprarenal capsules, and ovaries, but we have not actually found the parasite of Laveran. There was certainly in the spleen and liver a great quantity of black pigment in the leucocytes and macrophagocytes which filled up the vessels, but I am sure that if there had been hæmatozoa in abundance

as we had seen them in the nerve centres it would have been easy to make them evident. So we are obliged to admit that in this case the hæmatozoa localized their action principally to the nerve centres such as the brain, bulb and spinal cord, whilst the cerebellum was invaded to a slight extent only and the spinal ganglia still less.

Other observers before us, Laveran, Councilman, Marchiafava, Monti, Babès, Marinesco, and more recently Lafora, Margulis, Cevetti and Babès have described the presence of hæmatozoa in the central nervous system; but the inflammatory reaction of the vessels and the thrombus of lymphocytes are lesions which have been encountered exceptionally only. As to the inflammatory nodules which we may call by the name "malarial nodules," they are not mentioned in the writings of French, Italian, English or American authors. The essential cause of them seems to be a formative irritation due to the presence of hæmatozoa or their toxins. As to the mechanism of the myoclonic movements it is difficult to venture an exact opinion in the present state of our knowledge.



Sections of Neurology and Ophthalmology.

JOINT MEETING.

Dr. ERNEST S. REYNOLDS, President of the Section of Neurology,
in the Chair.

DISCUSSION ON OCULAR PALSIES.¹

Dr. GORDON HOLMES²

said that in studying lesions affecting conjugate movements they must keep in mind the complex physiological apparatus which regulated the normal movements. They occurred both in response to voluntary impulses and also as reflex movements excited by peripheral stimuli arising in the retina, ocular muscles, labyrinth, cervical muscles, &c. Some depended on the activity of subcortical centres only and others required the intervention of forebrain centres. The best known of the latter was in the second frontal gyrus, the motor centre for ocular movement, the existence of which had been proved experimentally on animals; there was clinical evidence of the presence of this frontal centre in man. It was associated with voluntary conjugate movements, and the paresis due to a lesion in this area might be more or less permanent, while the reflex movements were not affected. There was no proof that this area had anything to do with vertical movements. A second cortical centre had been found in monkeys in the angular gyrus, different areas in it being associated with upward, downward and lateral movements respectively, but there was no evidence for an oculomotor centre in this position in man.

Paretic deviation of the eyes was occasionally associated with lesions of the occipital lobes which produced hemianopia, but it was not constant and rarely lasted long; and it seemed probable that this efferent occipital system was not concerned in willed and purposive movements of the eyes, but movements excited by visual impressions.

It was disease of the brain-stem that produced the most complete and permanent, and consequently the most obvious, disturbances of the conjugate movements of the eyes.

The nuclei for the abducens nerve and that for the internal rectus were separated from each other by a distance of 3 cm., but there were association fibres which distributed exciting impulses to the cells of both, and these associated fibres appeared to be situated in the dorsal longitudinal bundle, which formed the associational and reflex paths. The evidence went to show that the origin of these fibres was in a supranuclear centre lying orally and slightly ventrally to the abducens nucleus, and that here all impulses were probably correlated and co-ordinated to produce an adequate response, and the resultant was transmitted to the motor cells. The various fibres belonging to the different functions which converged in this supranuclear centre might be

¹ At a joint meeting of the Sections, held March 10, 1921.

² Full report ("Palsies of the Conjugate Ocular Movements") published in *Brit. Journ. of Ophthalm.*, June, 1921, pp. 241-250.

injured, a striking example of which was seen in the case when voluntary deviation of the eyes was lost, but the reflex movement persisted.

Disturbances of the conjugate vertical movements of the eyes were more difficult to explain, since the presence of controlling supranuclear mechanisms could not be so clearly demonstrated and their anatomical position had not been definitely proved. But they were forced to the conclusion that there was such a mechanism probably situated in the anterior quadrigeminal bodies.

Loss of upward deviation was usually associated with disturbance of pupil reactions to light and that of downward movement frequently with loss of convergence and accommodation. These palsies, as in the lateral type, might be dissociated, i.e., loss of voluntary movement with reflex movement unaffected.

Mr. LESLIE PATON¹

said that the subject of ocular palsies was one of extreme complexity. One disease alone, syphilis, was capable of producing an ocular motor paralysis in numberless different ways. It might affect any part of the oculo-motor apparatus, cortical, supranuclear, nuclear, nerve roots, nerve trunks in their intracranial course, in the cavernous sinus, or in the orbit, or it might affect the muscles themselves. A gumma might develop at any point. A syphilitic meningitis might affect the nerves. Syphilis set up disease of the vessels and they might get hæmorrhages affecting the nuclei or nerve roots, or a syphilitic arteritis in the internal carotid might press on nerve trunks in the wall of the cavernous sinus, or an endarteritis might affect the vessels supplying the crura, the mid-brain or the pons, and give rise to areas of softening; or syphilis might give rise to tabes or general paralysis, and to all the variety of ocular disturbances arising in these diseases. Yet it was doubtful if more than 40 per cent. of cases of ophthalmoplegia were due to syphilis, directly or indirectly.

Oculo-motor paralysis might be divided into three main groups, with sub-groups:—

(I) Paralysis of central or cerebral origin, comprising three sub-groups:—

- (1) Supranuclear lesions.
- (2) Internuclear lesions.
- (3) Nuclear and nerve root lesions.

(II) Paralysis of extra-cerebral origin—i.e., of nerve trunks, again comprising two sub-groups:—

- (1) Intracranial.
- (2) Intraorbital.

(III) Paralysis of muscular origin.

The arrangement and relations of the oculo-motor nuclei was the subject of much discussion, and no dogmatic opinion was possible in the present state of their knowledge.

The important inter-nuclear set of fibres was undoubtedly in the posterior longitudinal bundle, and it was by means of the posterior longitudinal bundle that the various oculo-motor nuclei were brought into connexion with one another, and with the vestibular and auditory functions, and with the general muscular sense and other afferent impulses in the body.

The connexions of the posterior longitudinal bundle were intricate, and, so far, had not been at all completely worked out.

¹ Full report ("Ocular Palsies"), published in *Brit. Journ. of Ophthalm.*, June, 1921, pp. 251-271, with illustrations and references.

The most important nucleus of origin of these fibres undoubtedly lay in Deiters's nucleus.

The control of the internal musculature of the eye was also a matter of very considerable doubt and dispute.

The vascular supply of the oculo-motor nuclei was derived from the anterior end of the basilar artery. Vascular lesions affecting the pons and crura, and other lesions affecting the same region, gave rise to various very interesting forms of crossed hemiplegias. The most important of these were known by the names of "Weber's syndrome," "Benedict's syndrome," "Foville's syndrome," and the "Millard-Gubler syndrome."

Nuclear ophthalmoplegias or ophthalmoplegias proper, could be subdivided into acute and chronic types. The acute forms included the toxic form caused by alcohol. Wernicke's acute polio-encephalitis superior hæmorrhagica was the best example.

Good examples of the infective type of acute ophthalmoplegia were found in lethargic encephalitis, influenza, and syphilis, but in a very definite proportion of acute ophthalmoplegias no infective agent had been found.

The most important form in chronic progressive ophthalmoplegia was that occurring in tabes and general paralysis of the insane.

Besides these, there were certain ophthalmoplegias of congenital origin and others which were of a distinct familial type.

(The Meeting was adjourned to the following day.)

Sections of Neurology and Ophthalmology.

JOINT MEETING.

Dr. JAMES TAYLOR, C.B.E., President of the Section of
Ophthalmology, in the Chair.

ADJOURNED DISCUSSION ON OCULAR PALSIES.¹

Dr. WILFRED HARRIS

said that with regard to Dr. Gordon Holmes' remarks concerning the posterior longitudinal bundle and the lesions there, between the sixth nucleus and the third nucleus, it appeared that cases of chronic nervous disease in which there was weakness of one or both internal recti in lateral conjugate deviation were not very rare. At any rate he had seen a number of cases in which that sort of picture was seen. At the present moment he had under care a man who developed acute symptoms, possibly due to disseminated sclerosis, as his articulation resembled that met with in this disease; he also had ophthalmoplegia. He could not look upward at all above a horizontal line, but could look downward quite well. In making conjugate movement to the left or to the right, the outer eye went to the canthus, with nystagmus, but the inner eye scarcely went beyond the mid-line, and in it there was no nystagmus. That, he thought, was probably due to interruption of the posterior longitudinal fibre.

Peripheral palsies were not referred to at the previous evening's meeting—i.e., lesions beyond the exits of nerves—except in a general way. At the meeting they were told about lesions due to syphilitic disease, for instance of the internal carotid damaging nerves in the cavernous sinus. Damage in that situation he had seen many times following alcohol injection of the Gasserian ganglion. Usually in those cases it was the sixth nerve which suffered, presumably from an invasion of the outer wall of the cavernous sinus by the alcohol used. When it occurred it must be regarded as an accident which could not be helped. There was always recovery, after a few months, from this condition; he had not seen the consequent diplopia last more than four months. Sometimes the nerve involved was the third.

He had often wondered whether the term "rheumatic" could be properly applied to one palsy to which he would refer. Did members recognize a rheumatic neuritis of oculo-motor branches of the third or the sixth nerve in the orbit? It was not rare to see a palsy of the external rectus associated with a certain amount of pain in the orbit, but in which no cause was obvious. The pain might be referred to the eyeball, but there was no anaesthesia, and there were no other symptoms. The condition seemed to last, as a rule, about six months. Could this condition be rheumatic? The advice given would probably be to extract the teeth; but he did not think all the symptoms were pyorrhœic in origin. In some, no cause could be detected in the mouth, and it was possible some of these cases were rheumatic. He would like to

¹ At a joint meeting of the Sections, held March 11, 1921.

know whether others had encountered such cases, and whether they thought rheumatic neuritis could be diagnosed. He did not know how the point could be proved. The cases were not likely to be relieved by giving salicylate of soda, and even if they were, that would not prove them to be rheumatic.

A particular case, which struck him very much, was that of a very old medical friend of his, who developed diplopia which came on gradually for two months. The diplopia was upwards and to the left, and he noticed it particularly when he "pulled" a ball at golf. It was attributed to defect of the left inferior oblique. The speaker found, on testing him, that he had homonymous diplopia, with tilting of the image corresponding to affection of that muscle. He later got worse, experiencing severe pain, and his pupil became dilated; it scarcely reacted to light, and he lost power of accommodation, so that with the left eye he could not read small print. The pain was not very bad when he was seen by the speaker, but it became much worse later on, so much so that the words he used in describing it were "I am suffering the tortures of the damned." The pain spread to the right side, and, apparently, extended all over the face, but only for two or three days, after which it departed. The diplopia, however, persisted for nearly twelve months. The lesion, therefore, appeared to be in the neighbourhood of the ciliary ganglion. Could the damaging cause have been rheumatic in this case? There was nothing about the case to suggest sepsis. Ultimately the patient got well. No drugs brought any relief. The patient himself regarded the trouble as rheumatic, and Dr. Harris felt inclined to agree with him. Could rheumatic neuritis be safely diagnosed?

Dr. S. A. KINNIER WILSON

said that he would only discuss the question of a possible unilateral cranial polyneuritis—a subject of considerable clinical interest, though still largely speculative. Originally Frankl-Hochwart, of Vienna, described a case of what that observer called a polyneuritis—a condition in which several cranial nerves, including the eighth cranial, were involved, on one side only, in which he had reason to suppose a toxic cause was at work. The symptoms cleared up. In the course of last year, a pensioner came under his (Dr. Wilson's) care at the National Hospital, who had developed pneumonia and pleurisy in Cairo; in fact he had a generalized pneumococcal infection and was so seriously ill that he almost died. When this illness was at its height, at about the end of the second week, he developed a complete paralysis of the seventh, eighth, ninth, tenth, eleventh, and twelfth cranial nerves, on the right side only. When the man subsequently came under his (Dr. Wilson's) care there was unmistakable evidence of complete involvement of the seventh to the twelfth nerves on the right side, motor and sensory indifferently. Syphilitic tests proved negative. The history of the case, the manner of its onset, its diffuse character, involving both motor and sensory nerves, strongly suggested that it was a cranial polyneuritis of a toxi-infective character. The man was now slowly improving, and his symptoms were to some extent subsiding. In that case there happened to be no involvement of an ocular muscle or ocular nerve, but he thought the same sort of process was applicable to other cranial nerve combinations, to which the term "rheumatic" was often assigned.

During last year he had seen, at King's College Hospital, two cases, one

involving the fifth, sixth, and seventh, the other the sixth and seventh, in both cases on one side only. The second of these cases was that of a girl who certainly had a rheumatic "diathesis." There was a history of exposure to cold, and she developed the familiar Bell's palsy, apparently, coupled with slight but definite sixth nerve paresis. He could not prove the nature of the case pathologically, because it cleared up under antirheumatic remedies; nevertheless he suggested that, in the absence of any other ætiological factor, one was justified in thinking it might be a transient polyneuritis unilateralis.

The other case was that of a slightly older girl, in whom the fifth, sixth and seventh were involved, and he had held a similar view of her case. On examining her at the end of six months, however, he found the abdominal reflex on the opposite side was absent, and he suggested that in this case there might have been a small plaque of disseminated sclerosis. He only quoted it as a contrast to the others, in order to show how difficult it was to determine what was the ætiological factor in these cases. Unilateral cranial polyneuritis ought to be regarded as a clinical possibility.

Several cases of the kind had been described in the literature. One, recorded by Forlì in an Italian journal, was that of an engine-driver, who always stood and worked on the right side of his engine, so that the right side of his face was constantly exposed to wind and rain while on his journeys. Ultimately he developed a multiple paralysis of cranial nerves on the right side, with some pain, involving the third, fourth, fifth, seventh, eighth and twelfth. The symptoms disappeared after the use of anti-rheumatic remedies. There was no question or suggestion of syphilis in the case.

Cases of the kind were of considerable clinical interest. When on minute review of such cases known infections could be excluded, and when the symptoms cleared up after treatment, it was fair to suggest a slight polyneuritis. Cases of unilateral neuritis of the arm, for example, were certainly known to occur, and if that were accepted as a clinical possibility, why should there not be a polyneuritis confined to cranial nerves on one side only?

Mr. J. GRAY CLEGG

said that it was well known that paralyzes of the ocular muscles did occur in association with Graves' disease. Osler and McCrae regarded such as complications rather than part of the main disease. Allbutt and Rolleston stated that complete ophthalmoplegia externa only occurred rarely but Parsons in his "Pathology of the Eye," said that extrinsic ocular muscular paralyzes were not uncommon. In a discussion on Graves' disease recorded in the *Transactions of the Ophthalmological Society of the United Kingdom*, 1886, vi, p. 43, J. S. Bristowe reported a case in which ophthalmoplegia externa followed Graves' disease after an interval of three years, and no disease of the nervous system was found post mortem. Sir Samuel Wilks in the same discussion said he had never seen disease of the eye occurring in Graves' disease. Hughlings Jackson designated the case of ophthalmoplegia externa with Graves' disease mentioned by Bristowe and another by Francis Warner in 1882 as remarkable. Other cases of Graves' disease with paralyzes of ocular muscles were mentioned in the same discussion. Warner in 1900 reported a second case (*Medico-Chirurgical Transactions*, 1900, lxxiii, p. 97) in which the ophthalmoplegia was not complete, movements in various directions ranging from 10° to 45° being present. James Finlayson (*Brain*, 1890, xiii, p. 383) reported a

case with paralysis of the third nerve, not an ophthalmoplegia, and he quoted from an article in the *Revue de Médecine*, 1888, by Gilbert Ballet in which a number of cases were cited. Arthur Maude (*Brain*, 1892, xv, p. 121) recorded a case with general left ophthalmoparesis. In the *Medical Journal of Australia*, November 15, 1919, George E. Rennie reported a case of exophthalmic goitre combined with myasthenia gravis in which the latter condition greatly improved, but although no ptosis persisted there was still paresis of the external ocular muscles giving rise to occasional diplopia.

According to C. F. Suker (*Journ. Amer. Med. Assoc.*, 1917, lxxviii, p. 1255) a new ocular muscle symptom was present in quite a number of cases of Graves' disease which he designated as a "deficient complementary fixation in lateral eye rotations." Suker considered that it was due to the same underlying conditions that produced the other ocular muscle symptoms—viz., a dissociation in the functions of the sympathetic and the extra-ocular motor nerves of the eye. Perhaps also an element of muscle exhaustion on extreme lateral rotation of the eyes might be a contributory factor in producing this sign or accentuating it.

Whether such slight interference with the innervations of the extrinsic muscles was common or not, undoubtedly it was quite a rare association for practically bilateral double ophthalmoplegia to occur and he (Mr. Clegg) therefore thought the following case might be recorded. It was the only one he had seen personally during twenty-seven years' experience.

R. E. S., female, aged 44. First seen August 28, 1918. History: Diplopia since October, 1917. Drooping right upper lid since fall in November, 1917. General health poor since April, 1918. Patient presented typical signs of Graves' disease. Pulse 120. Very definite enlargement of thyroid with pulsation evident. Slight tremor of hands. Proptosis moderate. Could close eyes easily. Practically no movement of globes which were in primary position, but on attempting to look down upper lids could be lowered slightly, and the centre of each cornea could be rotated downwards about 2 mm. Diplopia varied in type from day to day, no doubt the result of changes in the bulk of the orbital cellular tissue. Using coloured glasses he (Mr. Clegg) had found diplopia only on slight movement of the head, but ordinarily no diplopia when gazing straight forward. Crossed diplopia noted at reading distance, owing to absence of converging power. Maddox rod showed 5° of esotropia at distance and 15° of exotropia at 25 cm. from face. The pupils equal, of medium width, and reacted normally to light and accommodation. All the other cranial nerves functionated well. Visual acuity: Right vision, $\frac{1}{2}$, with -1 D. sph., -1.5 D. cyl. ax. vert. = $\frac{2}{3}$ and +1 D. sph., -1.5 D. cyl., = J1 at 30 cm. Left vision, $\frac{5}{6}$, with -2.5 D. sph., -0.25 D. cyl. ax. vert. = $\frac{2}{3}$ and -1.5 D. sph., -0.25 D. cyl., = J1 at 30 cm. Left eye only used for reading, and after a few minutes' use right lid remained drooped. Media clear, fundi normal and fields of full extent.

November 14, 1918: Had had radium treatment. Felt better generally, eyes almost immobile, but right corneal centre could be rotated about 1 to 2 mm. Left side slight ptosis, but lid moved little on attempting to look down, whereas the right lid had about one-third of normal excursion. Diplopia now constant except when object straight in front and one metre distant from face. It was, of course, homonymous for distant objects and crossed for nearer than one metre. Orbicularis action very weak, inability to screw up lids, and the palpebral fissure could not be quite closed.

Some pain in eyes in December, 1918, and January, 1919. Further radium treatment applied between September, 1919, and May, 1920.

February 4, 1921: General condition greatly improved, gained weight. Tremors and palpitation gone. Pulse 70, but, if excited, rose to 80. Used eyes separately and alternately for reading. Conjugate ocular movements much improved, could turn eyes up 20° , down 45° , to right 30° , but to left only 10° . Proptosis very slight, but equal. Dalrymple's sign only evidenced by lower margin of left upper eyelid being 1 mm. higher

than the right, which was in normal position. Convergence could be maintained up to 18 cm. from face. Pupils, visual acuity and accommodation for age normal. For distant objects no diplopia (*a*) in primary position, (*b*) on looking up, or (*c*) on looking down and to right. When directing gaze directly down the left image rather lower than right; when towards the left side homonymous diplopia appeared. When looking down and to left, the left image was homonymous and rather lower. For near objects, if patient looked to right crossed diplopia appeared; when down, left image was below and to left. No doubling of images was experienced when eyes turned upwards or towards left.

The case, then, was remarkable in that practically complete bilateral ophthalmoplegia had occurred, and in that considerable recovery of ocular muscular power had taken place during convalescence from the general disease. Further, the recovery of power in the orbicularis palpebrarum would seem to confirm Mendel's opinion that that muscle was innervated from the third nucleus through the facial nerve along with the other oculo-facial muscles. At no time had there been any affection of the ciliary or sphincter iridis muscles.

The causative lesion was almost certainly in the nuclei of origin.

Paralyses of ocular muscles did not occur very frequently in private ophthalmic practice, for he had found that during twenty-two years he had only had 180 cases of definite paralysis and 111 of diplopia not certainly referable to any particular muscle or set of muscles. A few of the latter could be eliminated as occurring in concomitant strabismus.

Mr. R. FOSTER MOORE

said that there were two somewhat uncommon causes of ocular palsy: (1) Graves' disease and (2) spinal anæsthesia.

(1) There could be no doubt that the extreme pushing forward of the eyeball which occurred in some cases of Graves' disease was responsible for mechanical restriction of the complete amplitude of movement of the eyes; it seemed clear, however, that in some cases another factor came into play.

Cases in which a definite muscular weakness appeared to be present had been reported by Lang and Pringle (*Transactions of the Ophthalmological Society of the United Kingdom*, 1886, vi, p. 105); West (*ibid.*, p. 76); Ballet (*Recueil d'Ophthalmologie*, 1888, p. 321); Bristowe (*Brain*, 1886, p. 313); Warner, *Medical Times and Gazette*, 1882, p. 540; Maude (*St. Bartholomew's Hospital Reports*, 1892, xxviii); Voss, *Deutsche medizinische Wochenschrift*, August 13, 1903, and others. In none of these cases had there been involvement of the internal branches of the third nerve.

He had recently had occasion to explore the orbit in the case of a woman with Graves' disease in whom there was general limitation of eye movements and in whom the eyes were so proptosed that the eyelids on one side could by no means, even under a general anæsthetic, be brought together over the cornea, and it had been evident that if nothing were done this eye in particular would be lost from corneal sloughing. In the course of the removal of what fat was possible through an incision of the inferior conjunctival fornix, the inferior, external, and internal recti muscles had been exposed for some distance, and he had been surprised to find that, instead of flat, ribbon-like muscles, they were oedematous and much swollen fusiform bellies.

In a case of Bristowe's ("Diseases of the Nervous System," 1888, p. 141) in which ophthalmoplegia externa had occurred and which came to autopsy, the muscles were described as being pale.

Silcock (*Transactions of the Ophthalmological Society of the United*

Kingdom, 1886, vi, p. 103), who made a thorough histological examination of all the orbital contents, including the muscles and nerves, in such a case said :—

"There was nothing abnormal in the orbits except a most noticeable yellowish patchy discolouration of the recti and oblique muscles, which a microscopic examination proved to be due to interfascicular fatty infiltration, the muscle fibres themselves, though somewhat pale, showing no trace of fatty degeneration."

"The levatores palpebrarum markedly contrasted with the other extrinsic ocular muscles inasmuch as they were normal in colour, or perhaps merely a shade paler than normal."

The vessels and nerves were all examined histologically and showed no abnormality.

It seemed probable then, that when deficient movement of the eyes occurred in Graves' disease, it was due to impairment of function of the muscles as a result of their infiltration by œdema, or by fat, or perhaps by both, and that marked exophthalmos, when present, would introduce a mechanical factor which would contribute towards the same effect.

(2) The occurrence of ocular palsies after spinal anæsthesia was a somewhat rare complication, but the dependence of the paralysis upon the anæsthetic could not be doubted. It came on a few hours after the administration, was usually incomplete, and after persistence for many weeks the tendency was towards slow recovery. The abducens nerve showed its vulnerability in this as in so many other conditions, for it alone was usually affected.

Reber (*Journal of the American Medical Association*, July 30, 1910) reported five cases in 2,000 spinal anæsthesias, and had collected thirty-six cases from the literature. Of these thirty-six the sixth nerve alone was involved in thirty-two.

He (Mr. Foster Moore) had seen two cases, in each of which the sixth nerve alone had been affected. The selective involvement of this nerve was not easily explained satisfactorily, but Harvey Cushing (*Brain*, xxxiii, p. 204) suggested that here, as in other cases of indirect involvement of the sixth nerve, the paralysis was due to the relation of the nerve to the anterior inferior cerebellar or internal auditory artery, and pointed out, that as the nerve ran directly forwards, in many cases it was crossed ventrally and at right angles by one or other or both of these arteries. Cushing also suggested that if œdema of the brain occurred, these vessels were dragged upon, and cut into the pons somewhat like an india-rubber band, and constricted the sixth nerve to such a degree as temporarily to arrest its functions. In a few cases the third nerve had been implicated, and if they were prepared to accept the existence of œdema of the brain as suggested by Cushing, they might suppose that when this nerve was affected, it was nipped between the superior cerebellar and the posterior cerebral arteries with which it was in especially close relationship.

And whilst this explanation might perhaps be felt to be somewhat unsatisfying, there was this to be said in its favour, that it was just these two nerves, the third and the sixth, which were notoriously apt to be indirectly affected in intracranial disease, and which were in the most intimate relationship of all the cranial nerves with large arteries, and arteries too which, being anchored ventrally by the basilar artery, tended to encircle the brain stem, and were therefore most likely to constrict the nerves.

Dr. JAMES COLLIER

said that he had only had time to hear the excellent disquisition given by Dr. Gordon Holmes the previous evening, in which he had drawn special attention to the "unwillingness" in conjugate deviation which occurred in some cases of cerebellar disease. This was a comparatively new and exceedingly important matter. During the last few years he (Dr. Collier) had had several cases in which this unwillingness of the patient to deviate the eyes to the side of the cerebellar lesion had been a very definite feature. It might interest Dr. Holmes to know that he had had one case, of secondary growth following carcinoma of the breast, in which there were very striking unilateral cerebellar signs, and in which this reluctance or unwillingness to perform conjugate deviation was especially marked. The small secondary growth was found occupying the site of the opposite red nucleus.

His remarks would deal with a very interesting group of peripheral palsies of the oculo-motor nerves, doubtless well known to all of them, but to which due importance did not seem to have been attached in text-book descriptions and in the common teaching of oculo-motor paralysis, namely, those paralyes which were due to an inflammatory lesion in the region of the sphenoidal fissure and which might involve the sixth, the fourth, the third, and the first and second division of the fifth cranial nerves, but which never spread to the inner part of the orbit and never affected the optic nerve, nor the ophthalmic artery or veins. They were referred to as cases of orbital periostitis or fibrositis. They had a characteristic clinical aspect in the majority of the cases and in his experience had always recovered. In the past fifteen years at the Royal Eye Hospital and elsewhere he had followed more than forty cases to their termination. He would especially emphasize the non-syphilitic nature of this condition for he had only had one case with a positive Wassermann reaction in the whole series, and would point out what seemed to be a very close analogy between this condition and the common condition of peripheral facial paralysis or Bell's palsy both as regards ætiology, symptomatology, treatment and recovery. He would try to convince them that cranial nerves other than the oculo-motor and facial nerves might be affected by a similar condition and that some of these might be simultaneously affected in cases of oculo-motor paralysis of the type with which he was now concerned. The age incidence had been from puberty to old age and most commonly in the first half of adult life. He had not seen any case in childhood. The characteristic symptoms were :—

(1) The onset with *orbital pain* of a neuralgic character, which might be slight or even absent in those cases in which the sixth nerve only was involved but which might be terribly severe and lasting when the first and second divisions of the fifth nerve were involved.

(2) *Proptosis* ; slight in degree but always detectable.

(3) *Tenderness on pressure* upon the globe of the eye.

(4) *Oculo-motor Paralysis*.—The sixth nerve seemed to be commonly the first to be affected, and the pathological process might not extend beyond this nerve; but the usual sequence was the involvement of sixth nerve, third nerve, first division of the fifth, fourth nerve and second division of the fifth in that order. Loss of sensibility in the divisions of the fifth nerve was conspicuous. He had seen the third nerve involved before the sixth had been affected. In two cases it had been obvious that the sixth nerve was recovering while the nerves towards the inner end of the sphenoidal fissure were becoming

progressively involved. The condition had been bilateral and symmetrical in the two eyes in one case. He had observed a second attack of the condition in one case of a boy aged 18 who had come to him in 1912 with great orbital pain and paralysis of sixth, third, fourth and of the two divisions of the fifth. He had recovered completely in six weeks. He had returned to him nine years later in 1920 with orbital pain and sixth nerve paralysis, and under observation in three days developed the complete picture. He had recovered perfectly in a month.

He had not been able to trace any septic process in nose or sinuses or teeth in connexion with this malady but in one case secondary growth from a concealed epithelioma of the nasopharynx had given an almost identical clinical picture for a time. Exposure to cold upon one side of the face had been the indubitable cause in a few of the cases. The less severe cases had recovered in about six weeks, the severe cases in from three to five months, and every case had recovered completely except for some tendency to neuralgia in the fifth distribution. The treatment adopted had been: (1) Inunctions of mercury. (2) Internal administration of iodides and salicylates. (3) Warmth and counter-irritation to the temple. (4) Adequate measures for the relief of the severe pain.

The analogy with peripheral facial paralysis was striking; the only known causal factor, exposure to cold; the onset with pain and with swelling and tenderness in the region of the styloid process in facial palsy; and the almost invariable recovery with the same treatment in the two conditions. It would greatly support his argument were he able to record a case in which ocular paralysis of this nature and Bell's paralysis had occurred simultaneously in the same subject. This he could not do, but he would briefly recount two cases which bore intimately upon this subject. The first was of a man, aged 38, who had come under his care at St. George's Hospital with a severe and complete left-sided ocular paralysis of this type. The Wassermann reaction, repeatedly examined, had always been negative. He had recovered in three months. Some few weeks after discharge he had been seized with severe pain in the left suboccipital region and this had been followed by difficulty of articulation. On examination he had presented a complete left-sided peripheral hypoglossal paralysis from which he had recovered in about two months. This man was still under his observation after a lapse of two years and he had perfectly recovered except for slight neuralgia of the upper fifth. Here then was a case in which similar pathological conditions had occurred both at the sphenoidal fissure and at the anterior condylar foramen.

Some months ago a lady had been sent to him by Dr. Woodley Stocker, of Willesden Green, who after a severe attack of suboccipital pain complained of difficulty of articulation. She presented a peripheral hypoglossal palsy on the side on which the pain was. She had now completely recovered.

He submitted that the ocular palsies under consideration, peripheral facial paralysis and paralysis of other cranial nerves such as the hypoglossal in the two cases which he had mentioned were the result of identical pathological conditions.

He had been much interested in the remarks of a recent speaker with regard to ocular paralysis following spinal anaesthesia. He had been unaware of this condition until a few weeks ago. A man had presented himself at the hospital who had had his prostate removed under spinal anaesthesia, and when he (Dr. Collier) had seen him, he had presented complete bilateral palsy of the sixth nerve.

Mr. M. S. MAYOU

reported the following two cases of paresis of the upward and downward movements of the eyes:—

Case I.—G. C. (solicitor), male, aged 46. On October 20, 1920, while straining at stool, was seized with severe pain in the head and giddiness, and on getting up was hardly able to walk owing to diplopia and inability to look in downward direction. Seen by Mr. Mayou next day. Eyes when looking straight forward were in medium position and pupils active to light. Upon effort being made to look in upward direction no movement of eye or eyelids. On trying to look down, slight jerky movement but no real alteration in position of eye. The movement outward and inward unimpaired, and convergence present. Complained of diplopia on attempting to look down. Vision in each eye $\frac{1}{2}$. No optic neuritis. Knee-jerks present. Wassermann reaction negative. Put on iodide of potassium and enjoined complete rest from work. When seen again, on December 10, condition very much improved. Obtained full movement in downward direction, but with some limitation in movement of eyes upwards and coarse nystagmus present on attempting it. Had now almost completely recovered.

Case II.—J. C., male, aged 42, labourer (formerly a soldier). On January 9, 1921, patient suddenly seized with intense vertigo and diplopia. No headache present. Complained only of some rheumatism and cramp. Eyes in central position when looking straight forward. Pupils very sluggish. Vision $\frac{1}{2}$ in either eye. On requesting the patient to look upwards, eyes made attempt with extremely jerky movement but gradually fell back to original central position. On looking down the same thing occurred except that the patient was better able to carry it into effect. Outward and inward movements of eyes perfectly full and could be made freely. All power of convergence abolished. Patient denied venereal disease; Wassermann reaction negative. Knee-jerks present. Seen by Dr. Kimmier Wilson, who could not find any other change in nervous system. Put on iodide of potassium and had been gradually recovering. One month after being seen movement of the eyes improved, but still some diplopia on looking up and down in extreme excursion of eyes.

Mr. Mayou said it had never been his fortune to come across similar cases before, but by a curious coincidence he had seen two cases in less than six months. In the literature on the subject he had been able to find about six cases, two reported in this country, one by Lang and one by Fitzgerald. The sudden onset of the lesion associated with straining suggested that it was due to hæmorrhage. The actual situation of the lesion had been variously stated to be in the optic thalamus, the corpora quadrigemina, the pons, and the sub-cortex. As far as he could discover none of these lesions had been verified by post-mortem examination. Could anyone enlighten him as to the situation and nature of the lesion?

Mr. J. HERBERT FISHER

said he would only refer to one remark of Dr. Wilfred Harris. He understood Dr. Harris to suggest that paralysis of the sixth nerve sometimes followed injection of the Gasserian ganglion with alcohol, and that the damage took place in the floor of the cavernous sinus. He (Mr. Fisher) would have thought that was a rather improbable situation for such an event. He was aware of one case in which the sixth nerve was paralysed, and in which the lesion was not there. The injection through the foramen ovale in this case was difficult, and it was not accomplished either at the first or at the second attempt. At the third effort the injection took place with some abruptness. It was followed by paralysis not only of the sixth nerve on the side concerned, but also by paralysis of the seventh on the same side, and by an affection of

the auditory nerve. Facial paralysis, abducens paralysis, and total nerve deafness on the same side ensued. Recovery was very slow; deafness persisted, the sixth and seventh nerves did not fully recover their function, and troublesome neuro-paralytic keratitis was a complication. He thought the sudden yielding of the injecting piston resulted in such a quantity of alcohol being introduced that it stripped up the dura mater, and involved the sixth nerve, not in but behind the cavernous sinus, seeing that the seventh and eighth nerves were implicated in the posterior fossa of the skull. He considered that when the sixth nerve was involved, following alcohol injection of the Gasserian ganglion, the lesion was posterior to the cavernous sinus, especially as other important structures in the sinus showed no evidence of having been implicated.

With regard to exophthalmic goitre cases, he recently saw, in a man past middle age, a case of complete inability to elevate either eye above the horizontal position, accompanied by all the symptoms of exophthalmic goitre with the exception of swelling of the thyroid gland; besides the ophthalmic evidences he had a rapid pulse, tremor, and the general bearing of a patient with Graves' disease. He had been interested in what Mr. Foster Moore had said, viz., that when trying to deal with extreme exophthalmos in Graves' disease by extirpation of some of the orbital contents, he had found œdema and degeneration changes in the extra-ocular muscles.

The CHAIRMAN (Dr. JAMES TAYLOR)

said the fact of the possibility of paralysis of ocular muscles of so-called rheumatic origin had always appeared exceedingly interesting, though he had been somewhat sceptical about it, because seventh nerve paralysis was known to be a very common occurrence as a result of so-termed rheumatic neuritis. For many years he had watched cases of ordinary seventh nerve paralysis, but had never seen sixth nerve paralysis associated with it. True, in several instances that complication had been noted, but he thought it must be very rare, and he considered the conditions which caused a polyneuritis of cranial nerves on one side must differ from those associated with the occurrence of ordinary Bell's palsy.

He was disappointed that a little more reference had not been made to cases of myasthenia gravis, because this was one of the diseases interesting alike to the neurologist and the ophthalmologist. He was much indebted to his association with the Royal London Ophthalmic Hospital for the cases of myasthenia gravis he had seen; 80 per cent. of the cases he had observed were those referred to him by his colleagues there. One most astonishing thing in connexion with the condition was its extraordinary variability in course. In some, the course was definitely and consistently downwards; in others the progress was very slow and variable; one day the patient might have complete command of ocular movements, the next day he might scarcely be able to carry out any combined ocular movements. At Queen Square he had had under his care a man, recently dead, whom he had been watching for ten years or more, in whom the variability of the symptoms had been very striking. In other cases, however, the course had been relentlessly downwards.

There was still another class of case—and he thought Dr. James Collier had an experience similar to his own—of which the following was an example. Before the war a man was referred to him at the Royal London Ophthalmic

Hospital who had ocular palsies, double ptosis, &c., but with very little defect in the muscular movements of his limbs. He was admitted to Queen Square and treated in all sorts of ways, but the course was definitely downwards. First, he became unable to get about, then he could not feed himself because he was unable to lift his hands to his mouth, and he had to have soft foods because he could not chew. At this stage the man evinced an intense desire to return to his home in Hampshire. It was pointed out to him how dangerous the journey would be to him in his weak state, but his passion for his home became so strong that it was yielded to on the understanding that the hospital was relieved of responsibility if anything untoward happened on his journey. He went home, and the next Dr. Taylor heard of him was in a letter which the man wrote himself, saying he had almost completely recovered, but, although he could do his work as a carpenter, he did not feel equal to military service, and wished Dr. Taylor to certify that he had been suffering from myasthenia gravis. The man was still alive, and it was an undoubted case of the disease. Dr. Collier, he believed, had had under his care a female patient with a very similar history, who also insisted on going home, and turned up at the out-patient department a few months later apparently well.

MR. N. BISHOP HARMAN

said that in this discussion nothing would have given him greater pleasure than once again to attack Mendel's hypothesis of the relation of the facial and oculo-motor musculature and innervation, but since clinical cases coming within the range of these lesions were rare he was constrained to leave this part of the subject untouched; more especially so since he appeared to have had the last word on the subject, for so far as he could ascertain no one had as yet found reason and evidence to controvert the morphological facts presented to the Ophthalmological Society in 1903,¹ which to his thinking were completely destructive of Mendel's hypothesis. Or it would have interested him at any rate to discuss the implications of curious phenomena sometimes associated with paralytic ptosis, such as the see-saw movement to which he had drawn attention in 1902²; where, with the existence of ptosis of one side, the lifting of the drooped lid caused a drooping of the normal lid, so that as the paralysed lid was moved up or down the normal lid moved reversely down and up. This phenomenon he had observed in other cases of paralytic ptosis and in a minimal degree in some healthy subjects. But such phenomena were rare and their implications were physiological rather than clinical. Again, there were cases of congenital and sometimes hereditary defect of the oculo-motor muscles or innervation of the greatest interest,³ but they too were rare, and not strictly paralytic cases; they were congenital anomalies of development, and at no time had there been activity in the affected muscles. He would therefore confine his remarks to the clinical problems commonly presented to the ophthalmic surgeon in the regular run of practice.

When a systematic investigation was made into cases of acute ocular palsy one was impressed with the comparative poverty of the material available for analysis. Probably owing to the diagnostic interest of the cases they bulked largely in the memory and suggested an impression that they

¹ *Trans. Ophthal. Soc.*, 1903, xxiii, p. 356.

² *Ibid.*, 1902, xxii, p. 280.

³ Bradburne, *ibid.*, 1912, xxxii, p. 192.

were more frequent than they really were. He had examined the records of a group of private consecutive cases to the number of 5,000, yet amongst so many there were only twenty-seven cases of ocular palsy. So small a number did not furnish sufficient material upon which to found any generalization. In examining these cases a further difficulty was found, arising from the fact that a number of them were referred to the ophthalmic surgeon only for the purpose of his assisting the diagnosis, so that unless one was in somewhat close touch with the practitioner who had charge of the case it might not be possible to learn the later history of its progress.

(Mr. Harman then gave detailed notes of twenty-seven cases classified according to presumed primary cause.)

The cases fell into ten groups according to the known primary cause of the palsy. Injuries, syphilis, and muscular disease or degeneration accounted for twenty-one out of the twenty-seven. Males were affected in seventeen cases as against ten in females. The left eye suffered in sixteen cases as against the right ten times. In single muscle paresis of the recti muscles the superior was paralysed four times, the inferior not at all, the external eight, and internal three times; of the obliques a superior was paralysed three times, an inferior six times.

(1) *Injury due to falls* headed the list of cases with seven, or 24 per cent.; five were males. In five it was certain the injury played the primary part in the production of the paresis; in two there was a possibility that a "stroke" caused the faint or fall, and that the paresis might have been due to the effect of a cerebral lesion, but the balance of evidence supported the conclusion that the fall was accidental, and the subsequent paresis was traumatic. The diplopia was always persistent and unrelieved when complete, save in one case in which the vision of the eye was lost by steady progressive optic atrophy on the side of the injury. In another in which the paresis was partial the hyperphoria could be sufficiently corrected by a prism to give comfort.

(2) *Exposure*.—Two cases. These were a bone of contention between the neurologist and the ophthalmic surgeon. So far as he could judge by views expressed in earlier discussions of this nature (e.g., at the London meeting of the British Medical Association), neurologists did not agree that exposure to wet and cold could be directly and solely responsible for an ocular palsy, but believed that it was only an initial symptom of some serious nerve disorder. In both the two cases cited the association of chill with the paresis had been most definite, and it was noteworthy that there was no such association in any other of these cases. The peripheral nature of the lesion in Case 7 had been demonstrated by the appearance of the conjunctiva and local tenderness. Both cases had recovered with remarkable speed, with no more treatment than blisters to the temple, fomentations, faradism, and massage.

(3) *Syphilis*.—All five cases were in males. Relief was speedily obtained by appropriate general treatment given intensively and for a considerable period. There had been no further symptoms in these cases.

(4) *Migraine*.—In these two cases the diagnosis had been difficult, and had been arrived at by a process of exclusion. The age of the patients, 60 and 63, was against the diagnosis, but the character of the attacks and absence of other symptoms suggested some such vascular disturbance as migraine as the likely cause.

(5) *Vascular Disease*.—The two cases, both in women, were of interest. In one post-partum epilepsy with albuminuria, and in the other diabetes

were the assigned causes. In both the diseases were of long standing, and in both the paresis was recovered from speedily and without recurrence, although in both the primary causes continued, and in the diabetic case with serious threat of cataract.

(6) *Senile Degeneration*.—These three cases might have been added to the former group except that the age of the patients set them apart. In none of the cases had there been any indication of stroke or other serious cerebral disturbance, but probably each was due to some small hæmorrhage. One only recovered from the diplopia and lived four years without further trouble.

(7) The remaining cases numbered six: (1) one of myasthenia gravis of seven years' duration, with ptosis and vertical diplopia; (2) one of encephalitis lethargica with relief of downward diplopia in nine months; (3) one of slowly-growing brain tumour, during eight years there was a gradual increasing involvement of third and fifth nerves until death ensued; (4) three cases involving (a) left inferior rectus, (b) left external rectus, (c) left superior rectus. In each of these no cause could be assigned for the paresis.

Omitting the six cases of injury the majority of the remaining cases supported the contention of the neurologist that paresis of an oculo-motor muscle was a sign of serious general disease, but there was no evidence in the cases cited that life was shortened thereby.

Treatment.—The ophthalmic surgeon was generally called in, first, to assist diagnosis, and secondly, to indicate some means of overcoming the discomfort and danger of the diplopia. He knew of no more satisfactory measure of attaining the latter than the wearing of spectacles with one lens of fine ground glass; with these glasses there was no diplopia, yet the lateral field of vision of the covered eye remained effective beyond the bounds of the lens, so that the risk of a blind side presented by the wearing of a shade was abolished, and incidentally the appearance of the patient was improved. Prisms were rarely of use. Of local measures of treatment, blisters, faradism, and massage were undoubtedly effective where the lesion was peripheral.

In conclusion he suggested that they needed some means of "ringing" these patients, just as the ornithologist "ringed" his captives before liberating them once again, so that the subsequent history of the birds might be traced. It was his practice to tell patients suffering from these palsies, when they were his own cases, that such incidents might be an indication of some latent trouble, so that although relief might be obtained from the immediate symptoms they should without fail endeavour to seek medical attention if at any time other symptoms should ensue. He also asked them as a particular favour to make certain that their doctor at that time would communicate his findings to him (Mr. Harman) and promised on his part that he would put his record at the practitioner's disposal. Such a caution could be given without unduly disturbing patients, and it was of value in securing continuity of record.

MR. W. H. McMULLEN and MR. M. L. HINE

commenting on the subject of "Chronic Progressive Ophthalmoplegia Externa," or "Infantile Nuclear Atrophy," stated that, in their text-book on "Neurology of the Eyes," published in 1899, Wilbrand and Saenger had grouped as a clinical entity certain cases of external ophthalmoplegia which, in their opinion,

had certain definite characteristics which separated them not only from the congenital cases of this affection but also from the cases definitely due to some toxic cause, or to syphilis, or associated with some manifestations of more widely-spread disease of the nervous system. The cases thus grouped, these authors stated, had the following characteristics :—

(1) Onset was gradual, usually in infancy or early life, more rarely in later life.

(2) The ophthalmoplegia was bilateral and very slowly progressive.

(3) There were no other signs of disorder of the nervous system, and there was no affection of the general health.

(4) The disease might come to a standstill permanently, or for long periods, at any stage of its development, but generally ended in complete or nearly complete external ophthalmoplegia.

Mr. McMullen and Mr. Hine had been able to show two cases which seemed to tally with that description, while a third patient who had recently come under their observation unfortunately lived too far away in the country to be shown with the other two patients.

After a brief description of these cases they proposed to discuss their probable origin and the various views that were held as to their relationship with some other similar conditions, as it was by no means generally agreed that Wilbrand and Saenger were justified in regarding them as a separate group.

Case I.—Male, aged 42. First seen by Mr. McMullen at Royal Westminster Ophthalmic Hospital in 1911. Condition then found practically same as at present, fully described in *Transactions of the Ophthalmological Society*, 1912, xxxii. Onset with ptosis on left side at age of 8; recovery in a month, but recurrence a year later preceded by left frontal headache for two to three days. When admitted to St. Thomas's Hospital eleven days later (May, 1888), there was also ptosis on right side, which almost abated in five weeks. In addition to the ptosis on left side, some weakness of the left internal rectus. No other muscles affected, pupil reactions normal. Soon after leaving hospital the patient had illness called "rheumatic fever"; after this the ptosis increased. Two years later again seen at St. Thomas's Hospital; incomplete ptosis noted on both sides, more marked on right than on left. Hardly a trace of convergence. Pupils normal; could read J 1. Almost complete bilateral external ophthalmoplegia had therefore developed in three years from first onset of ptosis. No similar affection in any other member of family. No evidence of syphilis obtainable. Dr. Gordon Holmes unable to find any other signs of disease of nervous system. Ptosis now rather less marked than when first seen in 1911. Range of ocular movement slightly greater in right eye in upward direction, but otherwise the limits, as shown on a perimeter were about the same. These were now: Vertical, 16° right, 19° left; lateral, 8° right, 10° left. No appreciable convergence on looking at a near object. The left eye was then used for fixation. The pupils were equal and reacted to light. Accommodation good.

Case II.—Girl shown previous evening, now aged 20. Onset very gradual about age of 14, and condition not noticed until well advanced. Had been taken to Moorfields in September, 1915, when condition of ptosis and external ophthalmoplegia was noted. Range of movement of globes very limited; less now than when measured in 1919, and right eye almost completely immobile. The intra-ocular muscles were unaffected. No diplopia; no convergence. Patient appeared to fix with the left eye. Some fundus changes of old retino-choroiditis present, but no other stigmata of syphilis. The Wassermann reaction negative. In 1919 Dr. Gordon Holmes had found that her reflexes generally were diminished, but otherwise there were no changes in nervous system. As she had recently had "influenza" it had not been possible to get her up for further examination. Her mother had died in an asylum in 1918. No other members of family, nor relatives, were similarly affected.

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Case III.—A girl, aged 12. Onset with ptosis when aged about 8. Seen by Mr. Hugh Thompson in provincial school clinic, May, 1917; "photophobia" noted, but no affection of ocular muscles. When seen by M. L. H. in 1919 the ptosis and external ophthalmoplegia well advanced. No other member of the family affected. No evidence of other nervous disease nor of syphilis. No diplopia. When last tested with diaphragm test patient had been found to fix with the left eye.

In addition to cases collected by Wilbrand and Saenger, they (Mr. McMullen and Mr. Hine) found that similar cases had been reported by Beaumont, Ayre, and Altland. Beaumont's cases, reported in 1900, were of considerable interest, and were characterized by being (1) familial; (2) never congenital; (3) slowly progressive; (4) never fatal. In thirty-eight of the forty-eight cases they had found recorded the age of onset was given. In twenty cases it was before the age of 20, in twelve between 21 and 30, and in six only was it over 30.

The question arose as to whether this class of case was to be considered in a separate group. There were cases of congenital ocular palsy, presenting a similar clinical picture, in which there was evidence that nuclear defects were the cause. Moebius had grouped together, under the name of "Infantile Nuclear Atrophy," some cases of ophthalmoplegia externa developing in childhood with a number of others of congenital origin. Several congenital cases had been described during the last few years to which a nuclear origin had been attributed, though actual pathological evidence was very scanty. Siemerling and Heubner had both demonstrated nuclear changes, "an aplasia," in the similar condition of congenital ptosis.

In his text-book, Gowers did not very definitely dissociate "chronic progressive ophthalmoplegia" from other forms of ophthalmoplegia caused by syphilis, &c. He did say however that "in some cases, and in younger subjects, the degenerations seem to be due to deficient vital endurance of the structures concerned, varying in degree so as to be manifested at birth or not till later life."

Oppenheim had pointed out that there was a closely allied rare condition, which was known as "The Infantile form of Progressive Bulbar Paralysis," which was characterized by its hereditary and familial tendencies, and had been found to occur in brothers and sisters whose parents were closely related. In this disease the nuclei of the various cranial nerves were progressively affected, first those of the ocular muscles, and later those of the pharynx and larynx. He did not think there was any very hard and fast line between this affection and the class of case they had been considering. All might be due to an "abiotrophy," or "lack of inherent vitality" of the specialized cells of the cranial nerve nuclei involved, the time of onset depending on the degree of vitality with which these cells had been originally endowed.

Though Siemerling had stated that the condition under consideration might be entirely localized, there appeared to have been no pathological examination in any uncomplicated case of this affection. This however was hardly surprising when one considered its rarity and necessarily non-fatal course. Oppenheim stated, and clinical experience showed, that in the majority of cases of chronic ophthalmoplegia, this was only a precursor or local symptom of a complicated disease of the nervous system. But, in view of the cases to which they had again called attention that evening, it was important, from the point of view of prognosis, in the interest of the patient and his or her relatives, to realize that, in quite a number of these comparatively rare cases, there might be no threat to life and no development

of further serious organic disease. To lay stress on this fact, even though there might be no good pathological ground for separating them from some conditions in which the degenerative changes in the nervous system were wider spread, it might be useful to group these cases separately, including some at any rate of the congenital cases, in the same way as Moebius had done.

Mr. LESLIE PATON (in reply)

said he had very little to add, as the discussion had mostly veered away from the opening papers. And it was only right it should do so, because the subject was so enormous that the openers could not be expected to cover the whole field. Quite a number of ocular palsies which he had hoped other speakers would deal with had not been mentioned. There was, for instance, the very important group, namely, ophthalmoplegia and migraine, the paper on which, by Holmes Spicer and Ormerod, was one of the earliest in this country.

He was a little surprised at Dr. Harris's explanation of the sixth nerve damage from alcohol injections. He (Mr. Paton) had seen one or two of these cases, but he did not locate the damage where Dr. Harris did. He thought they were allied to another type of case—to which also no reference had been made—an example of which he was asked to see on Tuesday last. It was that of a woman who had sixth nerve palsy in association with mastoid disease, the so-called Gradinigo's syndrome, an affection of the sixth nerve as it passed over the tip of the petrous bone. That was, he thought, the point attacked when the alcohol went beyond its due region.

Another very interesting class not referred to in the discussion was that of ocular palsies associated with herpes ophthalmicus. With regard to myasthenia gravis, he did not know what was the modern pathology of this, but he understood it started in the nerve endings in the muscles, and progressed upwards from there. It was therefore with some hesitation that he had grouped it among the bulbar palsies and progressive muscular atrophies.

The cases referred to in Mr. McMullen's and Mr. Hine's contribution formed a very definite group, the isolated palsies occurring in people of early adult age. He had referred to them in his paper. In a certain number of cases, they formed a definite familial affection, uncomplicated by any other sign of nerve disease. In the interesting series of cases by Beaumont, one lived to 90, and his death then was due to old age. Mr. Lawford's case lived to the age of 84 without any other symptom of disease. In many respects the disease was very similar to Leber's familial atrophy. Like the analogous congenital ophthalmoplegias they could be classified into three groups: (a) without complications in the nervous system; (b) with complications in the nervous system; and (c) a familial type.